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Simpson

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(45) **Date of Patent: Jul. 14, 2015**

(54) **ADHESIVE APPLICATOR FOR THREADED DEVICES AND PROCESS FOR APPLYING ADHESIVE TO THREADED DEVICES**

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(73) Assignee: **FAIRFIELD MANUFACTURING COMPANY, INC.**, Lafayette, IN (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 913 days.

(21) Appl. No.: **13/118,732**

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(51) **Int. Cl.**

B05D 5/10 (2006.01)
B05C 3/09 (2006.01)
B05C 3/20 (2006.01)

(52) **U.S. Cl.**

CPC ***B05C 3/09*** (2013.01); ***B05C 3/20*** (2013.01)

(58) **Field of Classification Search**

CPC B05C 3/09; B05C 3/20
USPC 427/207.1, 421.1; 118/300, 326
See application file for complete search history.

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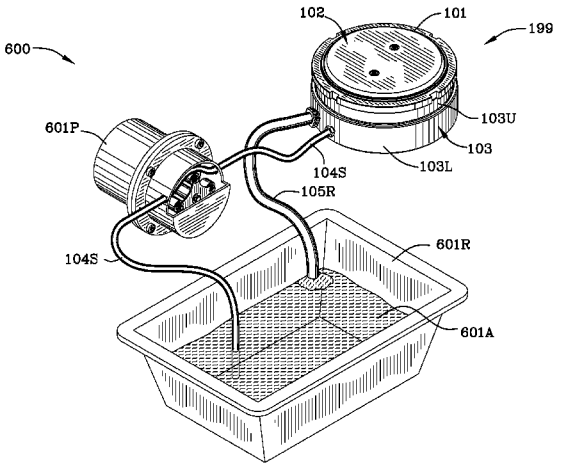
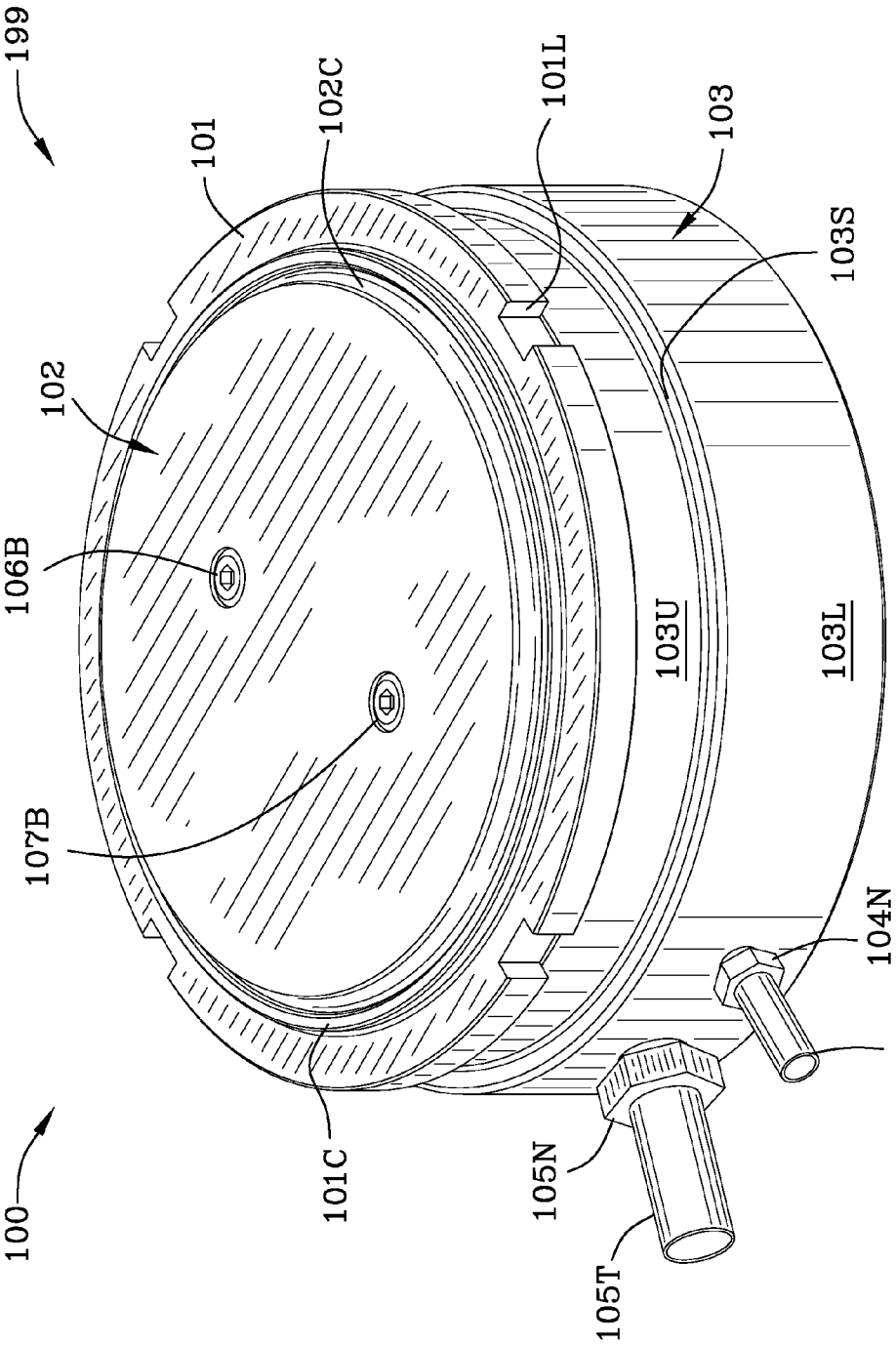
(57) **ABSTRACT**

An adhesive applicator includes a base portion and an adhesive distributing portion. The base portion includes a first passageway extending from the exterior of the base portion to and through an integral cylindrical portion of the base portion. The adhesive distributing portion includes a plurality of passageways therethrough in communication with the first passageway of the base portion. The plurality of passageways of the adhesive distributing portion extend to the exterior of the adhesive distributing portion. An adhesive pump forces adhesive to and through the first passageway of the base portion and into and through the plurality of passageways of the adhesive distributing portion to the exterior of the adhesive distributing portion. Adhesive emanates from the exterior of the adhesive distributing portion under the force of the adhesive pump and coats the threads of an internally threaded device. Another example coats the threads of an externally threaded device. Processes for coating internal and external threads are disclosed.

5 Claims, 16 Drawing Sheets

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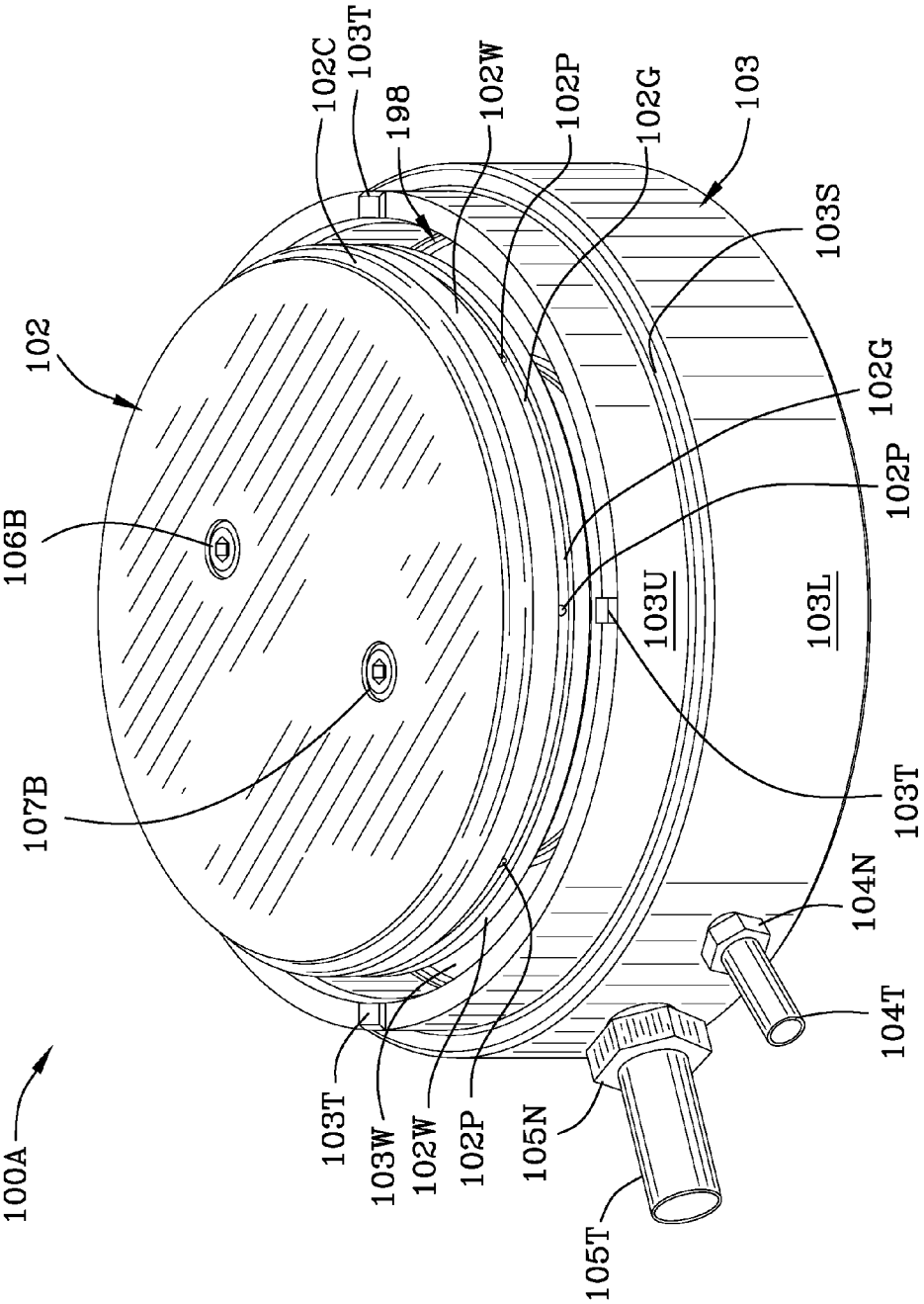
105N
105T

FIG. 1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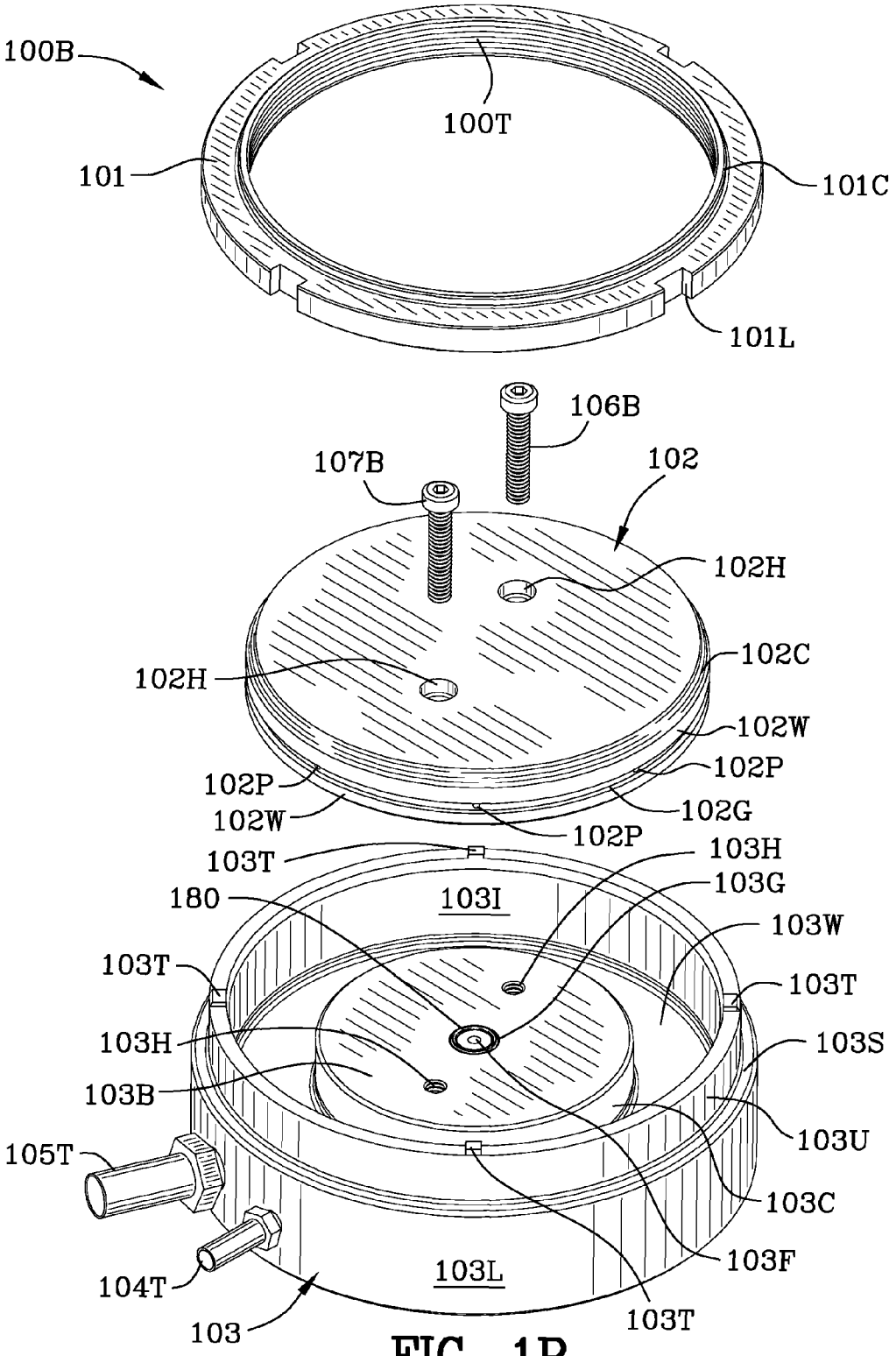
105T

FIG. 1A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102H
102H
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102P
102P
102W
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102P
103T
103H
180
103I
103G
103W
103T
103T
103H
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103U
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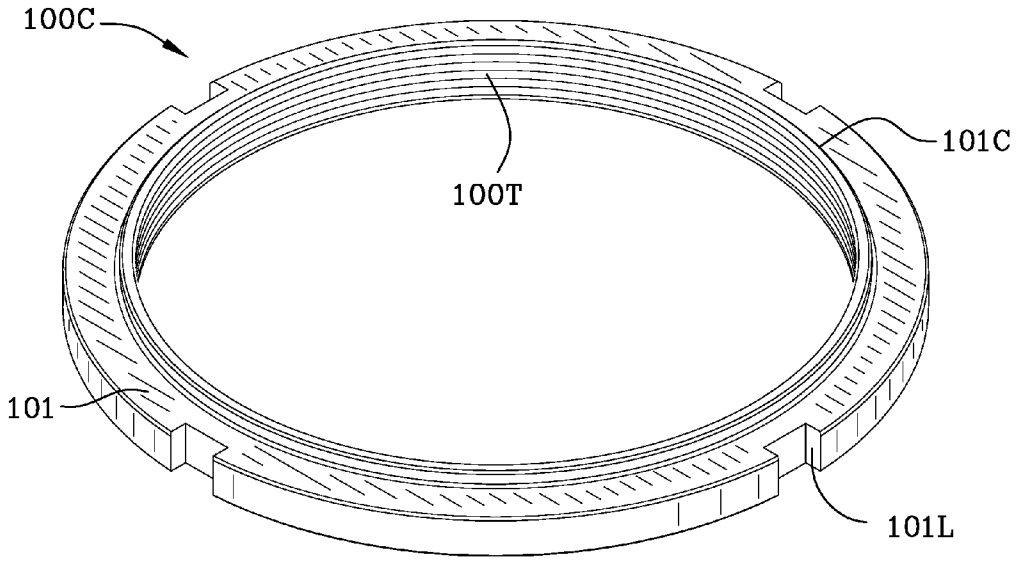
103C
103F
104T
103L
103T
103

FIG. 1B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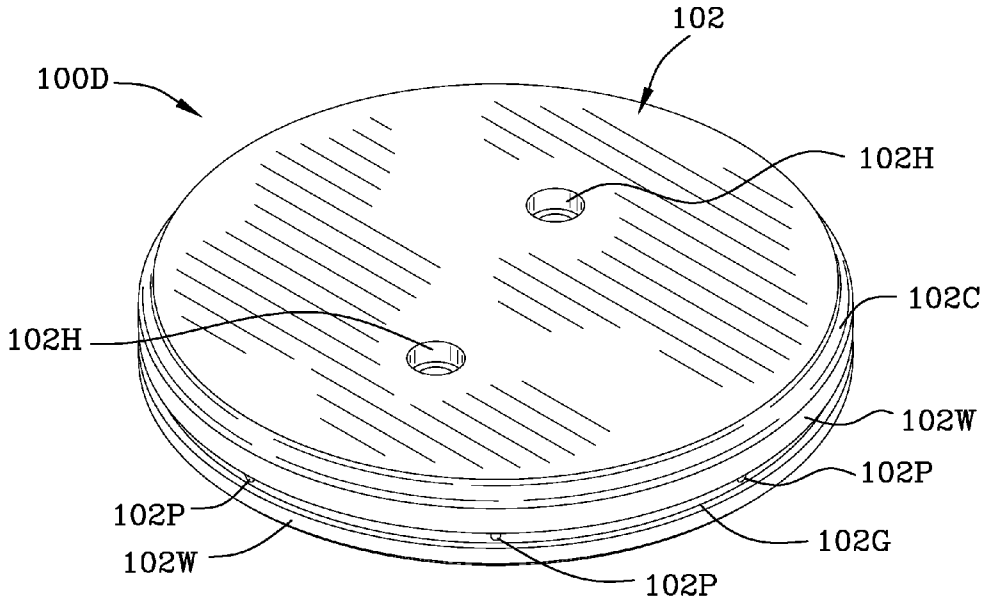
101C
101
101L

FIG. 1C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102H
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102P
102P
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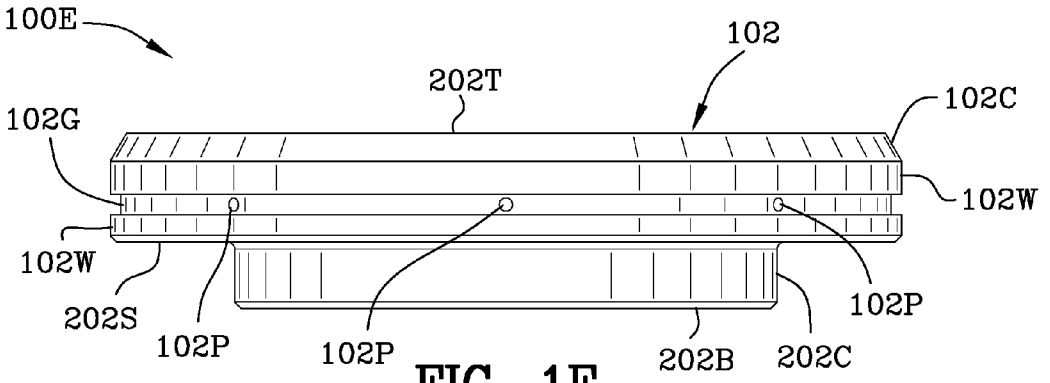
102P

FIG. 1D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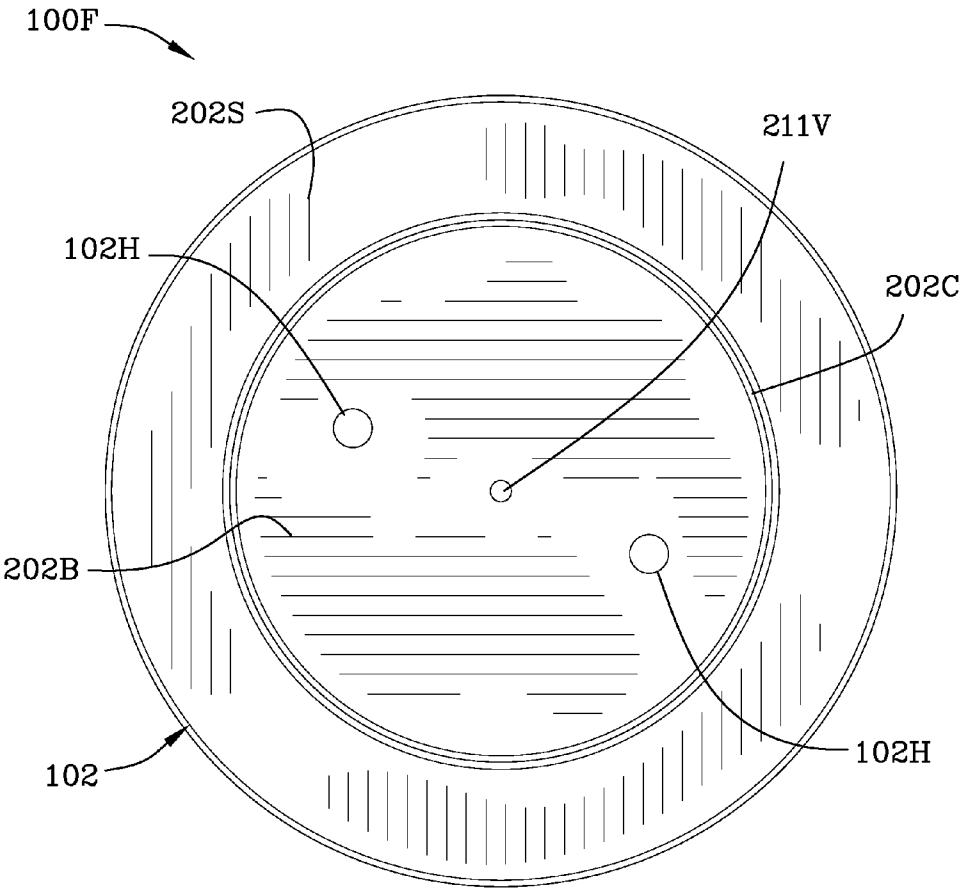
102P
202B
202C

FIG. 1E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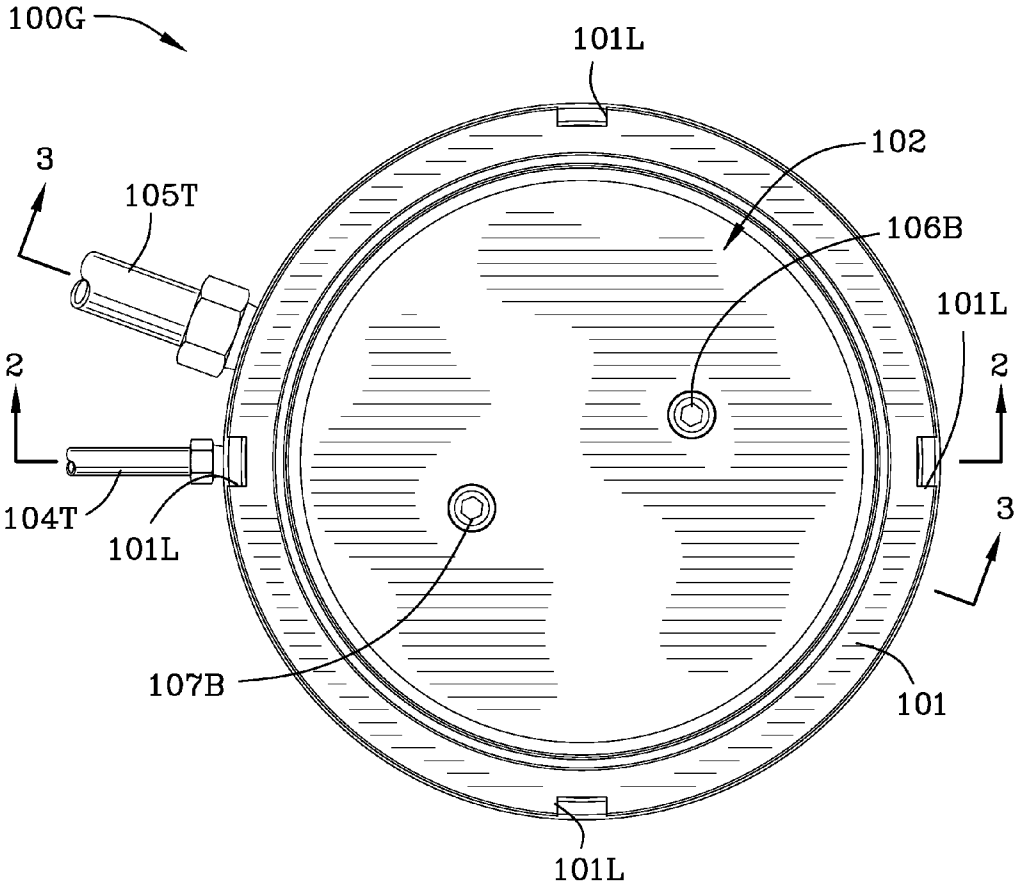
202S
211V
102H
202C
202B
102
102H

FIG. 1F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104T
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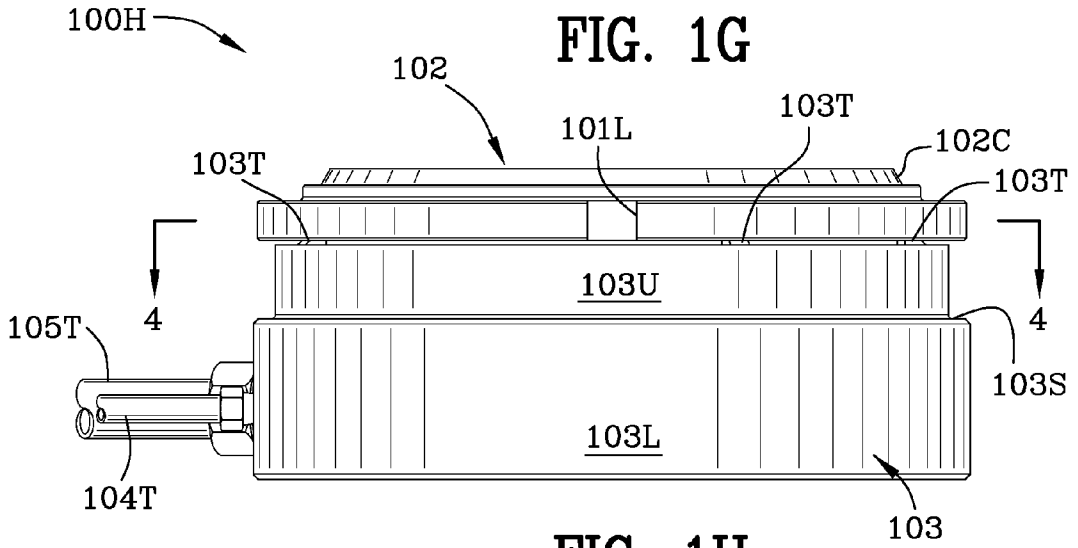
107B
101
101L

FIG. 1G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103S
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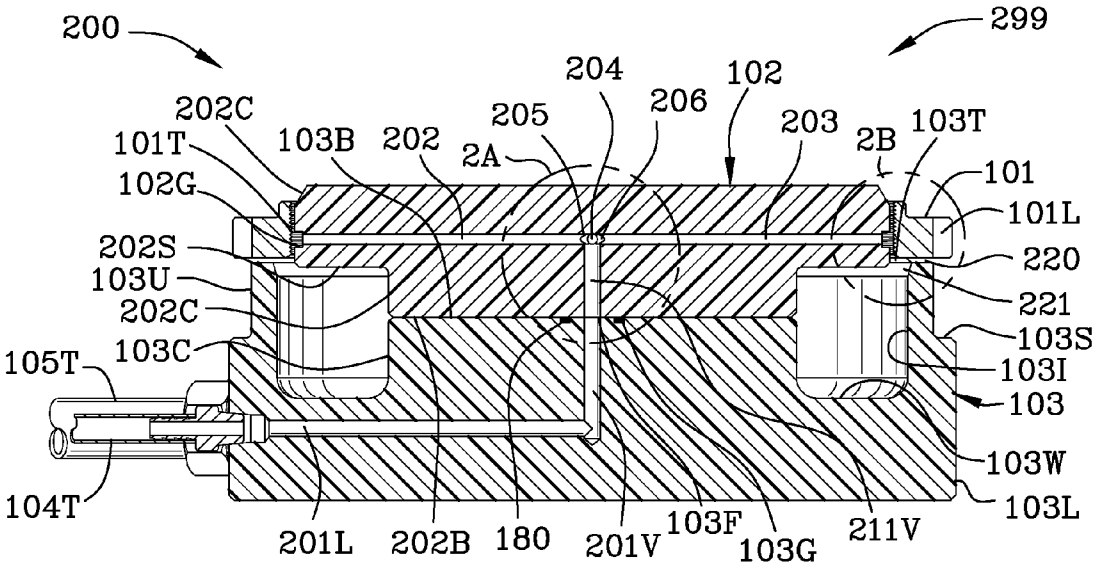
104T
103

FIG. 1H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299
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102G
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103U
221
202C
103S
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103C
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103L
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202B
180
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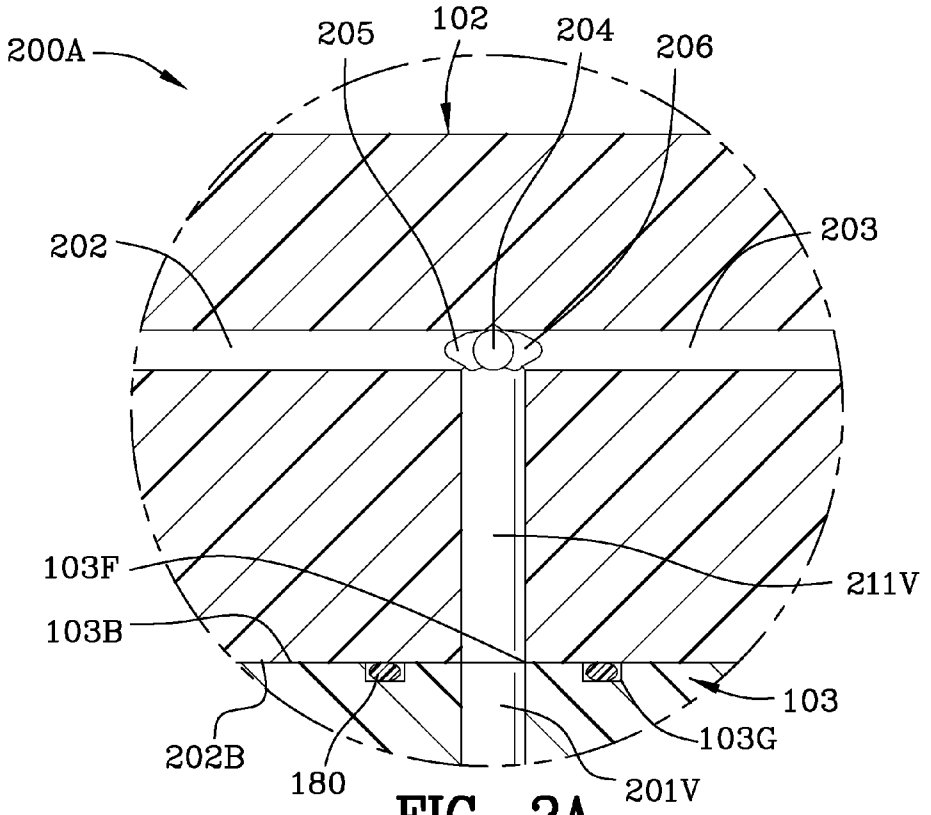
103F
103G
211V

FIG. 2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103F
211V
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103G
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201V

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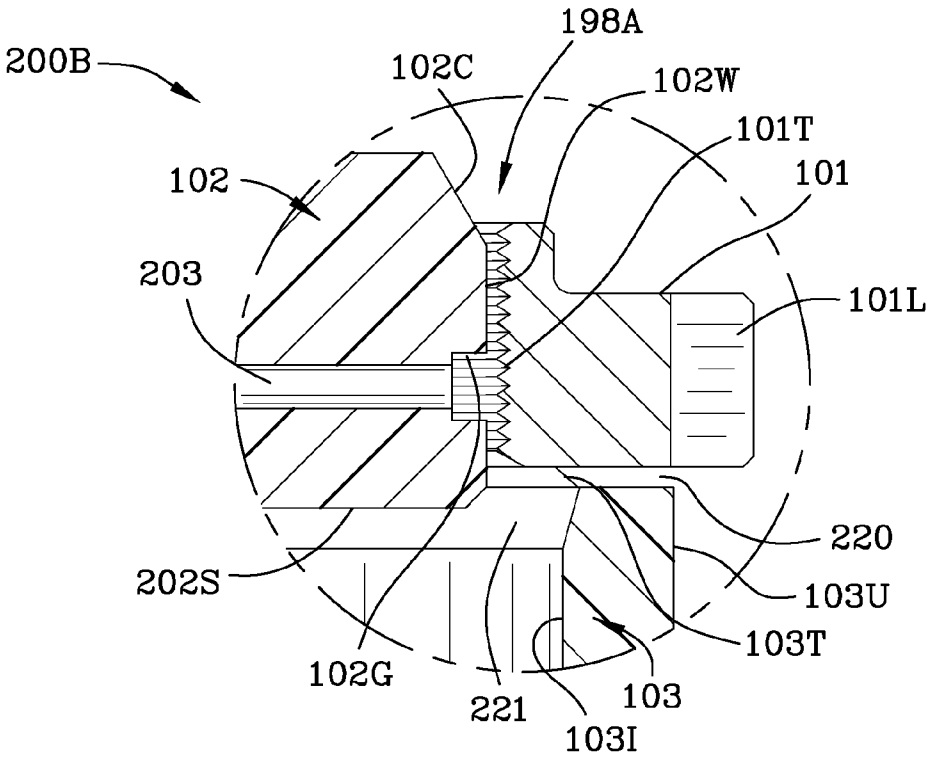
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198A
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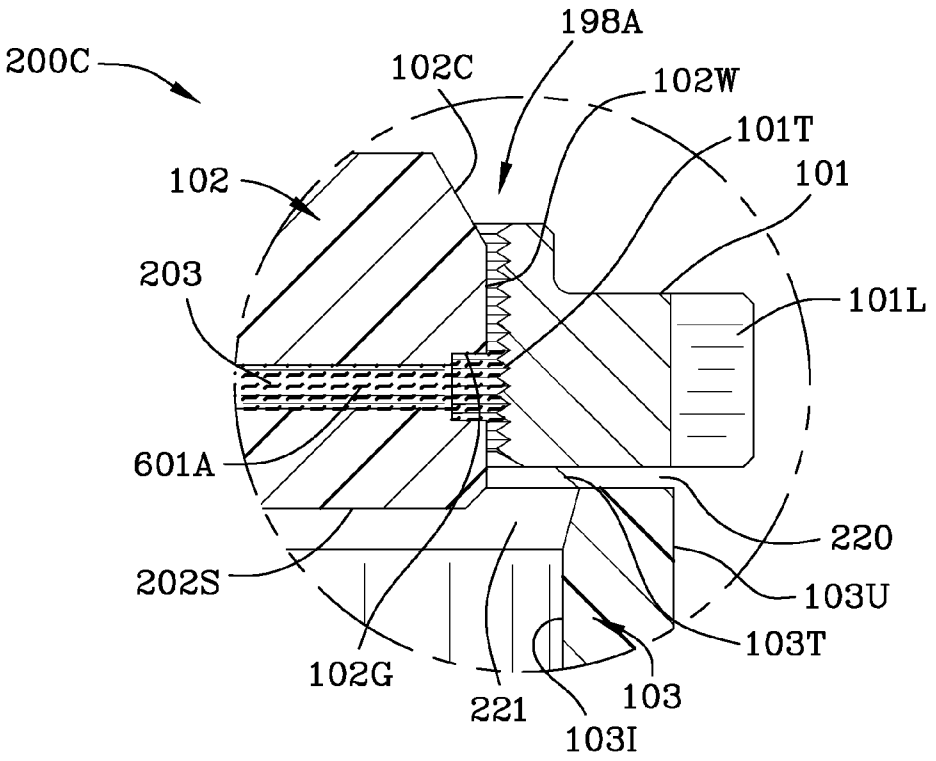
103I

FIG. 2B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198A
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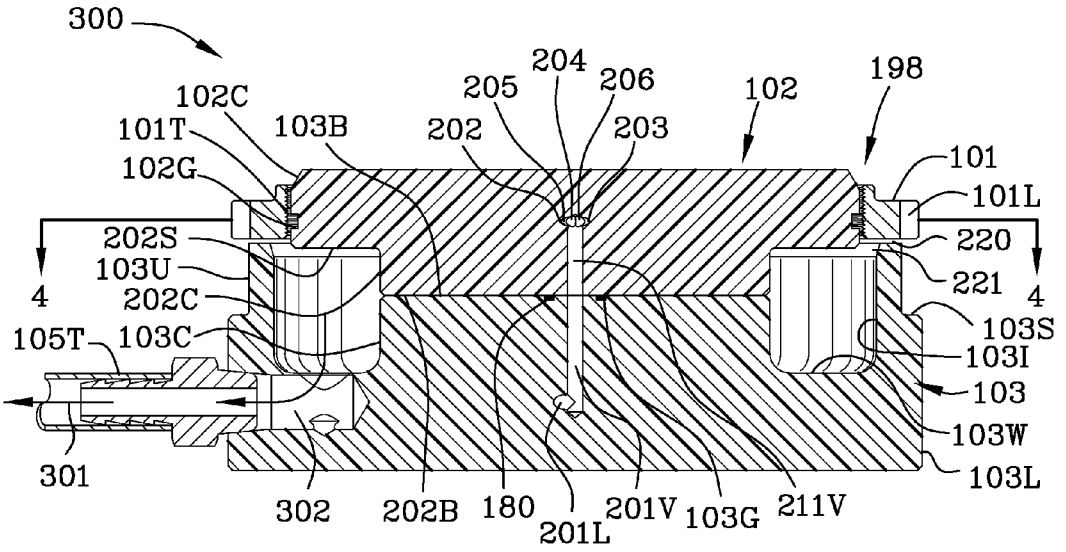
103I

FIG. 2C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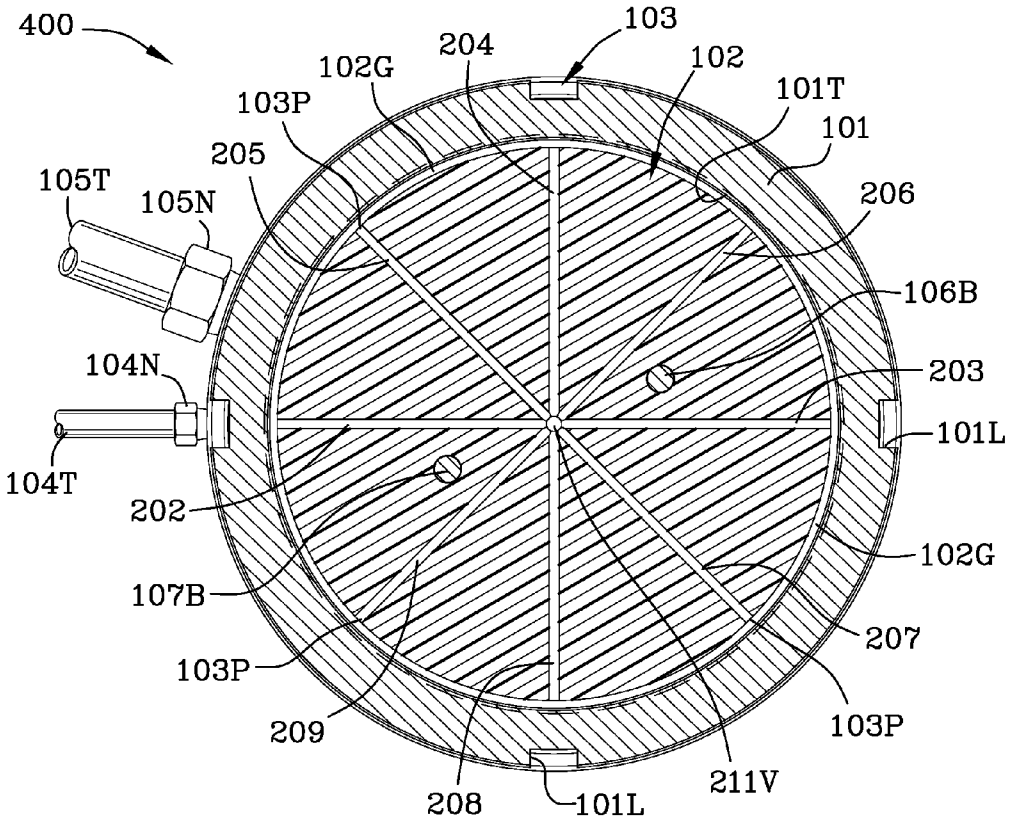
103G
211V

FIG. 3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102G
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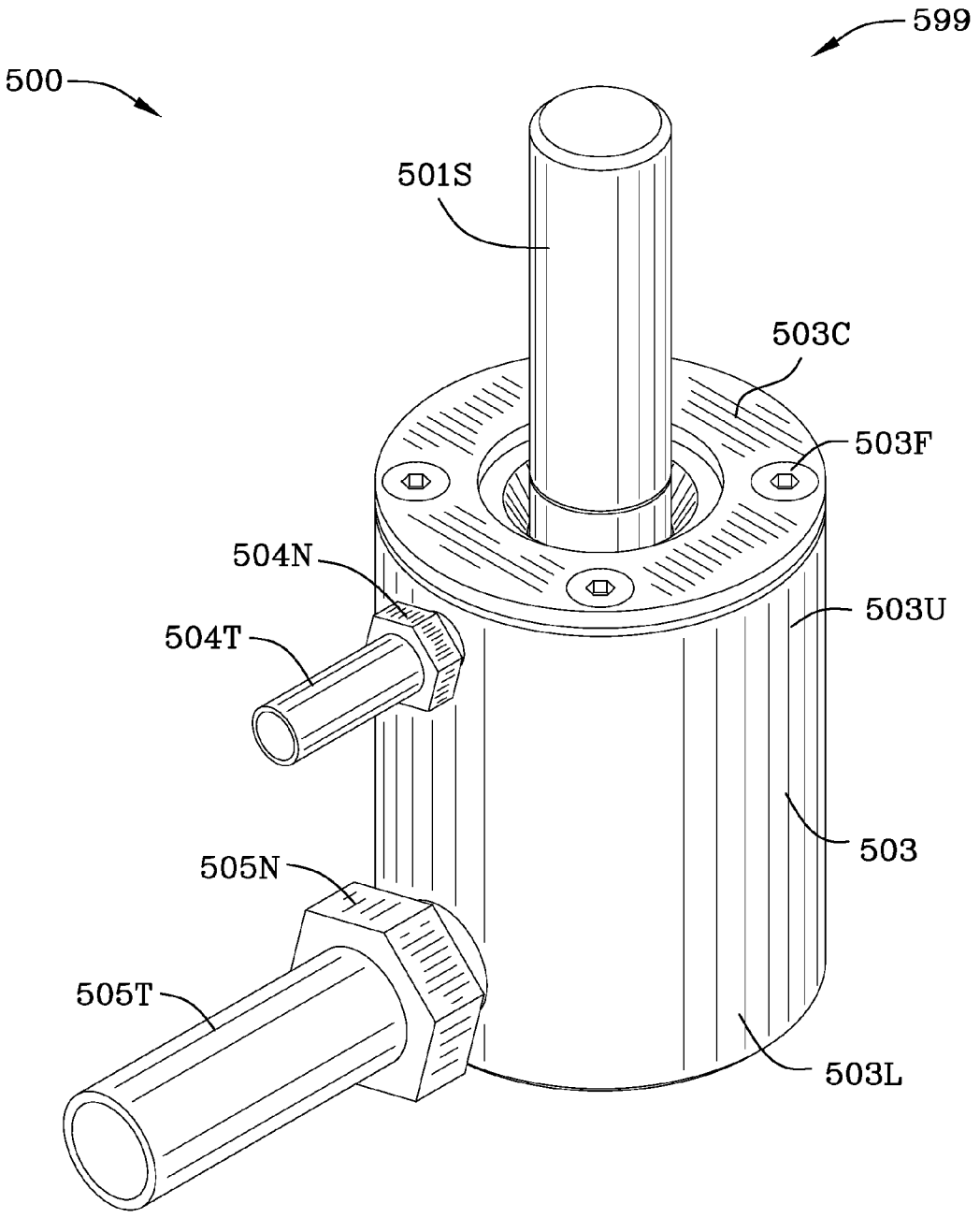
208
101L
211V

FIG. 4



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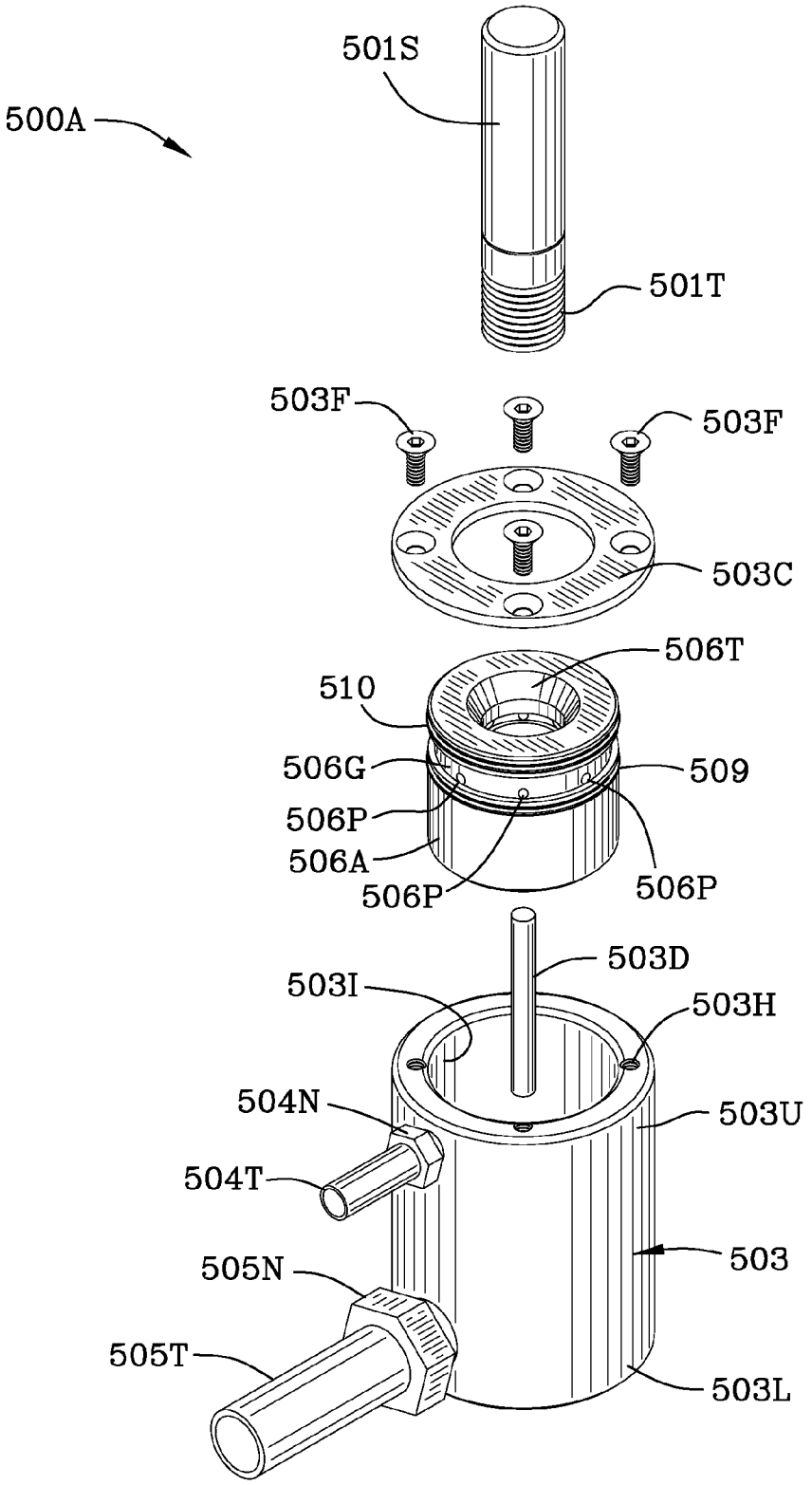
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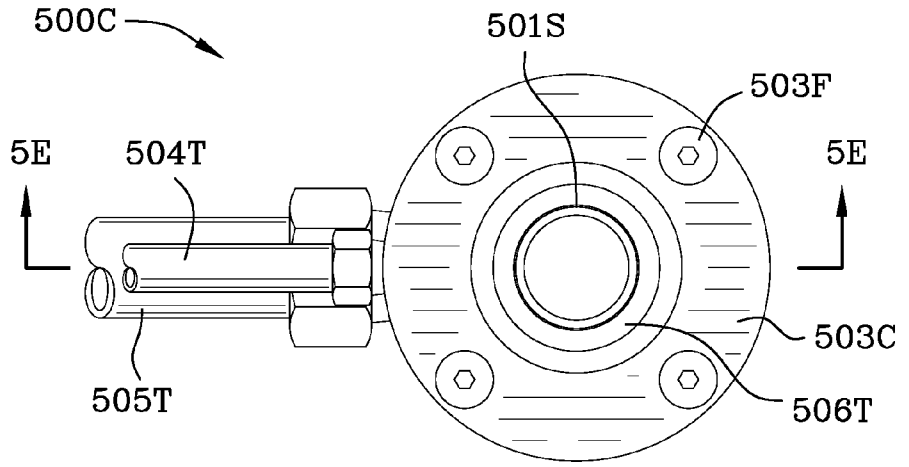
505T
503L

FIG. 5A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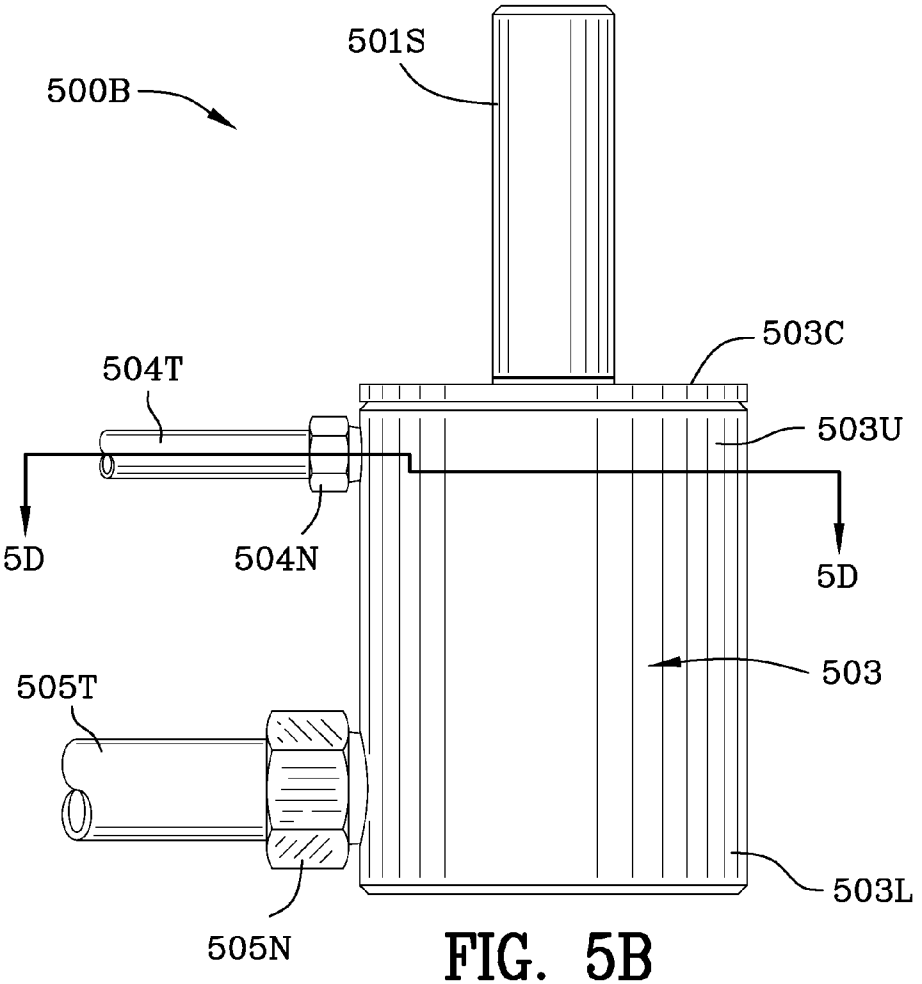
5E
504T
5E
503C
505T
506T

FIG. 5C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503U
5D
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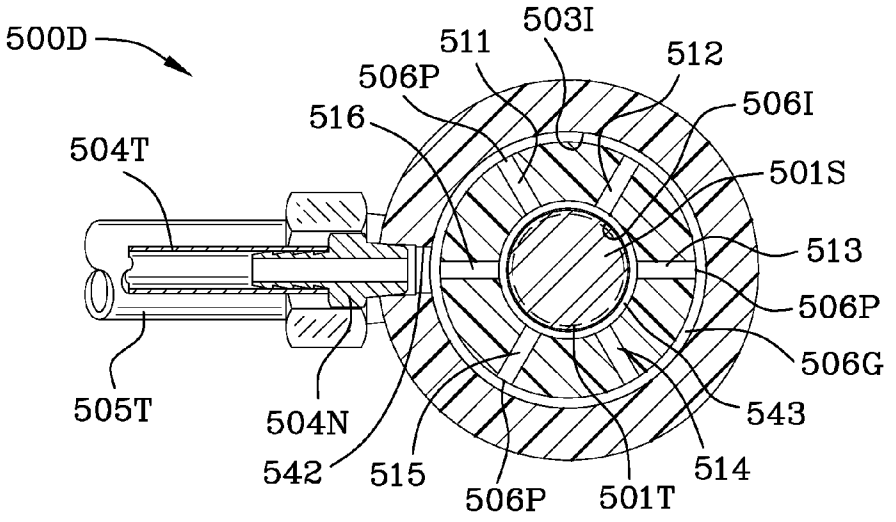
5D
503
505T
503L
505N

FIG. 5B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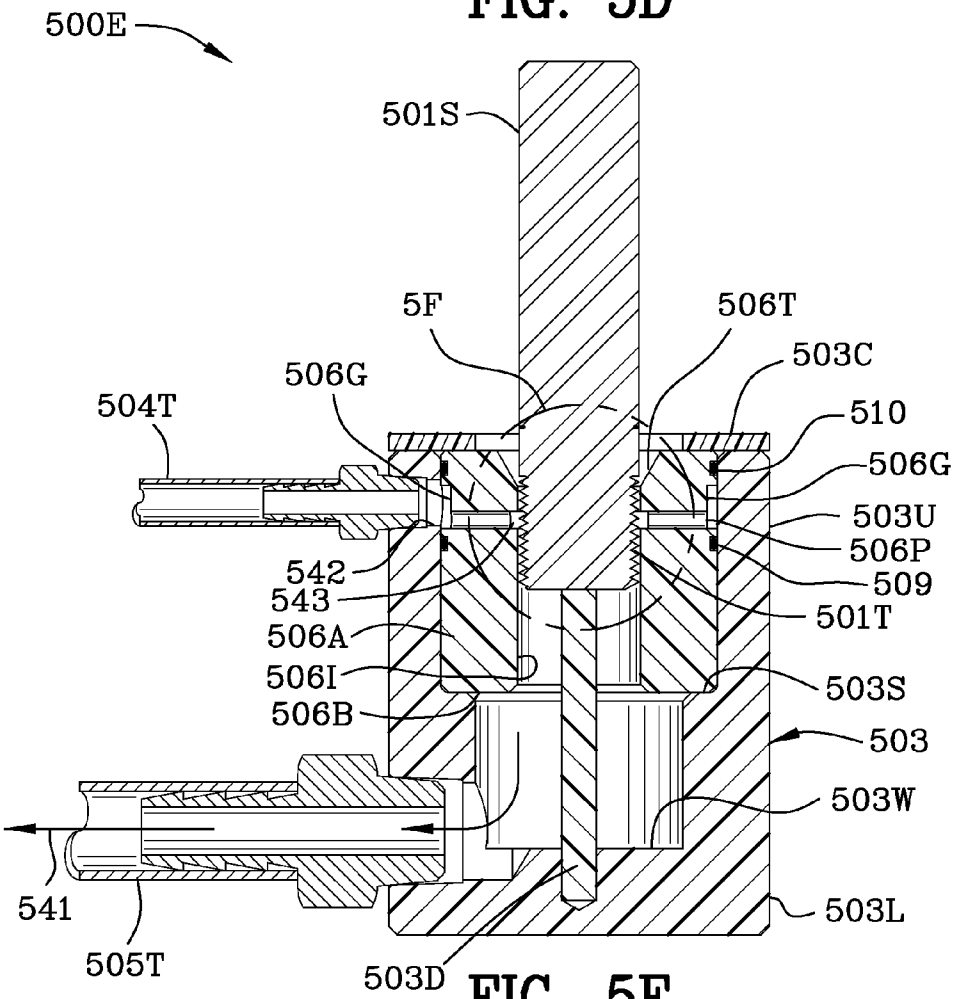
506P
501T

FIG. 5D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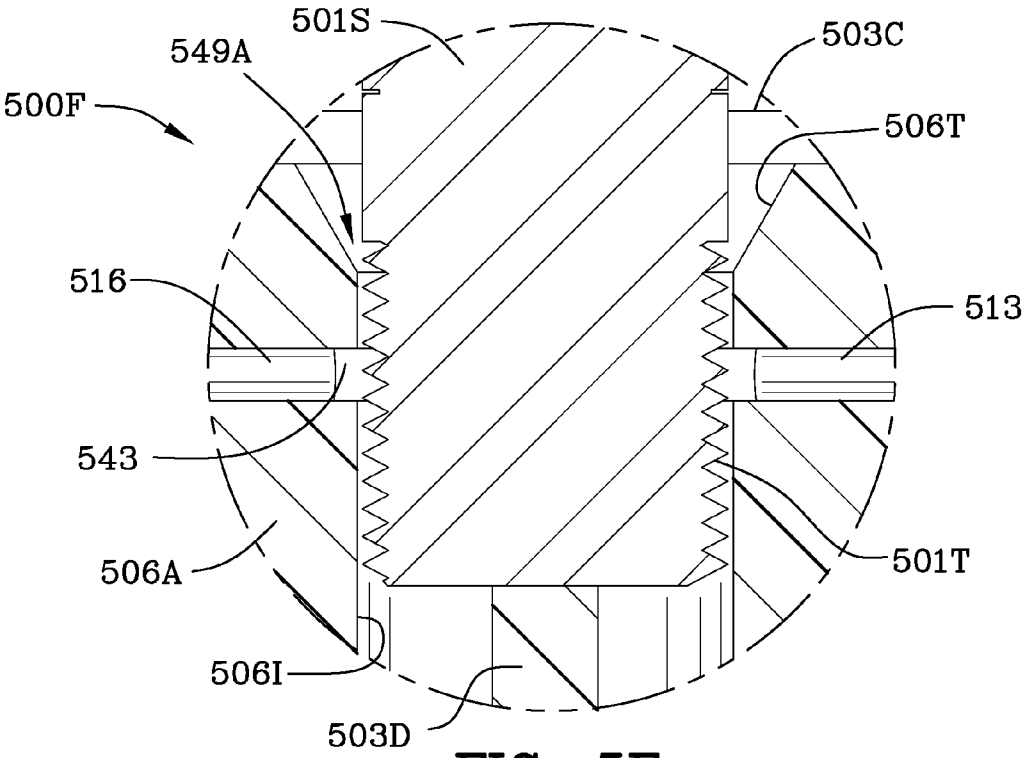
503D
503L

FIG. 5E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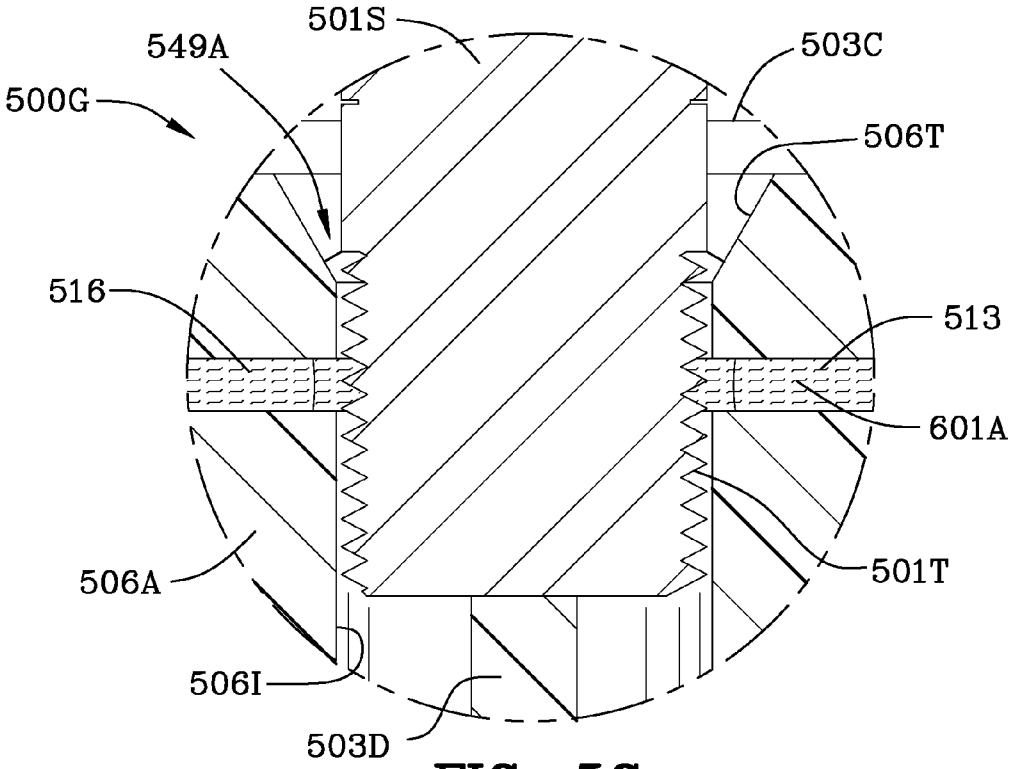
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FIG. 5G

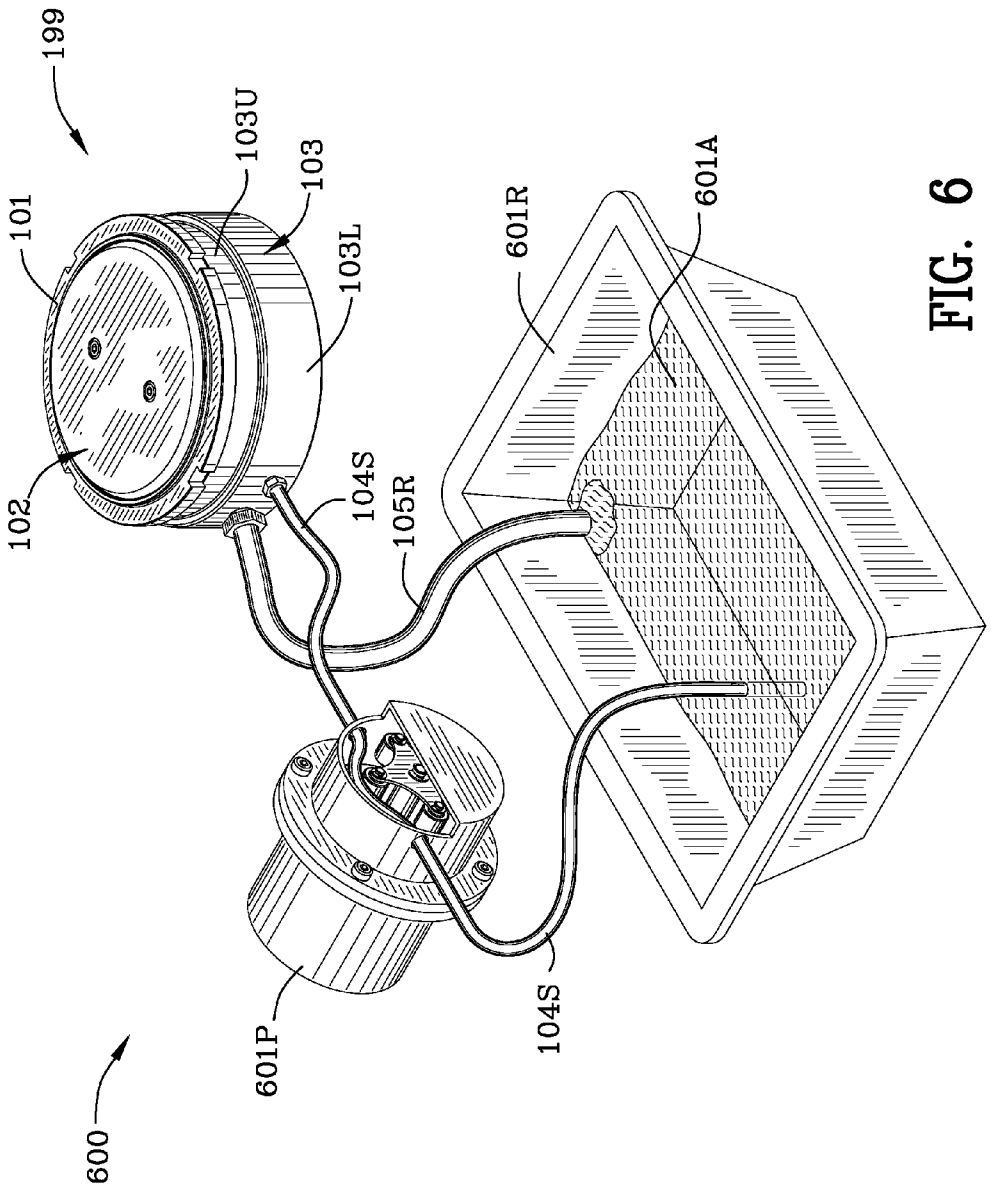

FIG. 6

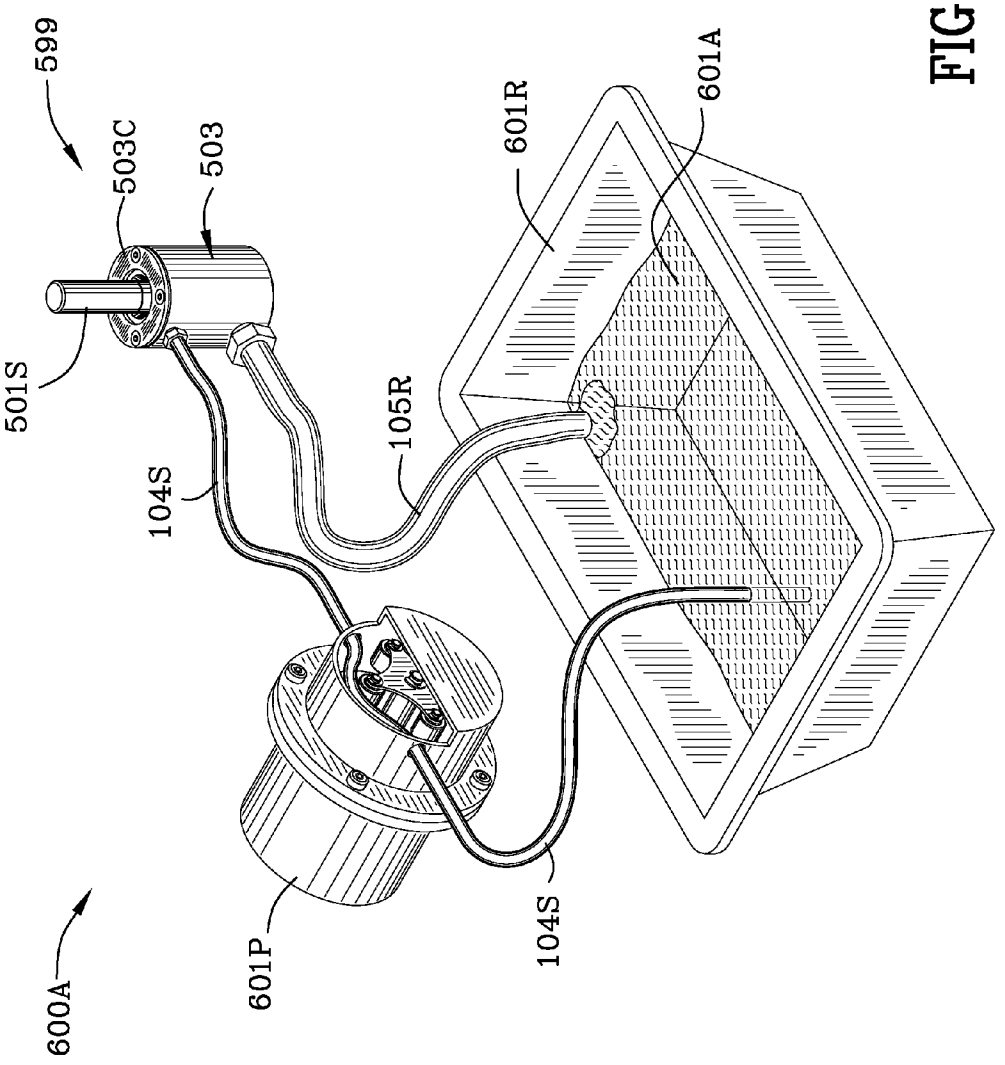

FIG. 6A

ADHESIVE APPLICATOR FOR THREADED DEVICES AND PROCESS FOR APPLYING ADHESIVE TO THREADED DEVICES

FIELD OF THE INVENTION

The invention is in the field of adhesive applicators which apply adhesive to threaded devices, primarily fasteners.

BACKGROUND OF THE INVENTION

U.S. Pat. No. 4,426,410 to Watson et al. entitled Method For Coating Internal Threads of Fasteners, states: "A method for coating the internal threads of a fastener includes a rotatable base for holding the fastener, and an applicator having a discharge orifice extending through its side wall which contacts the internal threads at a single point of tangency, the axis of the applicator being offset from the rotational axis of the base. Thus, an induced side load force is created at the point of tangency for effecting the pressing of discharged sealant into the roots of the threads. Differently sized internally threaded elements can be coated in accordance with the invention while using the same sealant applicator."

LOCTITE® is the trademark of the Henkel Corporation and is used in connection with an anaerobic adhesive for threadlocking. In particular, it is designed for the permanent locking and sealing of metallic threaded fasteners. A technical data sheet for LOCTITE® 263™, November 2009, Henkel Corporation, is submitted with this application as part of an information disclosure statement and is incorporated herein by reference hereto. LOCTITE® 263™ is one anaerobic adhesive used for threadlocking metallic threaded fasteners. Other adhesives including two-component adhesives may be used.

SUMMARY OF THE INVENTION

The invention is a liquid adhesive applicator for coating internally and externally threaded devices, primarily fasteners.

In regard to internally threaded devices, the adhesive applicator apparatus includes: a peristaltic pump to transport the liquid from a reservoir to an adhesive applicator portion which forces the liquid adhesive into the threads of an internally threaded device, and a recovery system to return unused adhesive to the liquid adhesive reservoir. The liquid adhesive is moved from the reservoir to the adhesive applicator portion by a peristaltic pump. The pump, through the use of a motor driven multi-lobed cam, moves the thread locker adhesive through the supply tube without contacting the liquid. This supplies adhesive to the pressure port of the adhesive applicator. The adhesive is then forced up a central supply passageway that intersects radial passageways to distribute the liquid adhesive evenly. The adhesive is forced through the radial passageways that intersect a circumferential groove. This allows the liquid adhesive to fill evenly around the entire diameter of the applicator. When an internally threaded fastener is placed on the applicator, the fit between the inside diameter of the threaded fastener and the outside diameter of the applicator is such that the adhesive is forced into the circumferential groove and the internal threads of the fastener. This evenly and completely fills all the threads in the area of the groove. When the fastener is then affixed to a mating threaded component, the adhesive is then spread to all of the threads of the fastener and the mating threaded component. The anaerobic adhesive then cures in the absence of oxygen to secure the metallic components to each other.

When there is no fastener in place on the applicator, the excess thread locker adhesive is allowed to collect in a drain well in the base portion of the adhesive applicator. During periods of non use the pump may be shut down. Short periods of non use will result in the recycling of adhesive via the drain well. From the well in the base portion, the liquid adhesive flows to the drain port where it is returned to the reservoir by gravity or a scavenging pump, to be recycled through the system. The entire adhesive application system is free from metal components in order to prevent reactions with the anaerobic thread locker. The adhesive applicator is plastic, preferably nylon. The adhesive applicator has no metal parts.

Still referring to internally threaded devices, the adhesive applicator includes a base portion and an adhesive distributing portion. The base portion includes a first passageway extending from the exterior of the base portion to and through an integral cylindrical portion of the base portion. The adhesive distributing portion includes a plurality of passageways therethrough in communication with the first passageway of the base portion. The plurality of passageways of the adhesive distributing portion extend to the exterior of the adhesive distributing portion. An adhesive pump forces adhesive to and through the first passageway of the base portion and into and through the plurality of passageways of the adhesive distributing portion to the exterior of the adhesive distributing portion. Adhesive emanates from the exterior of the adhesive distributing portion in an exterior groove under the force of the adhesive pump and coats the threads of a threaded device.

Still referring to internally threaded devices, the adhesive distributing portion includes an exterior and the base portion includes an adhesive drain well. The base portion includes an integral cylindrical portion and an exterior. The base portion includes a first passageway, the first passageway of the base portion extending from the exterior of the base portion to and through the integral cylindrical portion of the base portion. The adhesive distributing portion includes a second passageway therethrough in communication with the first passageway of the base portion. The second passageway of the adhesive distributing portion extends to the exterior of the adhesive distributing portion. A peristaltic adhesive pump forces adhesive to and through the first passageway of the base portion and into and through the second passageway of the adhesive distributing portion to the exterior of the adhesive distributing portion. The adhesive emanates from the exterior of the adhesive distributing portion in an exterior groove under the force of the adhesive pump. Use of peristaltic adhesive pumps is preferable as no pump part contacts the anaerobic adhesive directly. The tube used is oxygen permeable to prevent the anaerobic adhesive from setting up. The peristaltic pump engages only the outside of the pliable tube carrying the anaerobic adhesive. In this way, a clean and efficient pumping process is carried out with no chance of the anaerobic adhesive setting up on any metal parts of the pump in the absence of air or oxygen. Anaerobic adhesives adhere to metal surfaces in the absence of oxygen.

Still referring to internally threaded devices, the base portion and the adhesive distributing portion are plastic, preferably nylon. The base portion includes an upper cylindrical wall portion, and, the upper cylindrical wall portion of the base portion includes a plurality of integral tabs thereon. The tabs are used to support the internally threaded device. The device having internal threads engages the plurality of integral tabs and is substantially spaced apart from the upper cylindrical wall portion. The device having internal threads may be placed on the tabs of the upper portion of the base portion off center but, even in this condition, the adhesive

emanating from the exterior of the adhesive distributing portion under the force of the adhesive pump completely coats all of the internal threads.

Still referring to internally threaded devices, the adhesive distributing portion preferably includes a plurality of passageways (plurality of second passageways) in communication with the first passageway of the base portion. The plurality of passageways of the adhesive distributing portion extend to the exterior of the adhesive distributing portion, and, the adhesive pump forces adhesive to and through the first passageway of the base portion and into and through the plurality of passageways of the adhesive distributing portion to the exterior of the adhesive distributing portion and also into an exterior groove.

Still referring to internally threaded devices, the exterior of the adhesive distributing portion includes a circumferential groove and the second passageway of the adhesive distributing portion extends to the circumferential groove in the exterior of the adhesive distributing portion. Alternatively, the exterior of the adhesive distributing portion includes a circumferential groove and the plurality of passageways of the adhesive distributing portion extend to the circumferential groove in the exterior of the adhesive distributing portion.

Still referring to internally threaded devices, an adhesive applicator comprises an adhesive distributing portion. The adhesive distributing portion includes an exterior and a passageway therethrough. The passageway includes a first end portion and a second end portion. The first end portion of the passageway of the adhesive distributing portion is interconnected to an adhesive pump. The second end portion of the passageway of the adhesive distributing portion terminates at the exterior of the adhesive distributing portion. The adhesive pump forces adhesive to and through the passageway of the adhesive distributing portion to the exterior of the adhesive distributing portion and the adhesive emanates from the exterior of the adhesive distributing portion into a groove under the force of the adhesive pump. The device having internal threads engages the base portion, the base portion supporting the device, and, the device surrounds the exterior of the adhesive distributing portion. Alternatively, the adhesive distributing portion includes a plurality of passageways therethrough and each passageway includes a first end portion and a second end portion. The first end portion of each of the passageways of the adhesive distributing portion is interconnected with an adhesive pump. The second end portion of each of the passageways of the adhesive distributing portion terminates at the exterior of the adhesive distributing portion. The adhesive pump forces adhesive to and through each of the passageways of the adhesive distributing portion to the exterior of the adhesive distributing portion. Adhesive emanates from the exterior of the adhesive distributing portion into a groove under the force of the adhesive pump.

In regard to externally threaded devices, another example of the adhesive applicator includes structure for coating externally threaded devices, for example, studs having external threads. The adhesive applicator includes a base portion and an adhesive distributing portion. The adhesive distributing portion includes a cylindrical bore therethrough, the cylindrical bore forming an interior surface, and the adhesive distributing portion also includes an exterior. The base portion includes an interior, an exterior and the base portion includes a first passageway therethrough extending from the exterior of the base portion to the interior of the base portion. The adhesive distributing portion includes a second passageway therethrough which extends to the interior of the adhesive distributing portion. An adhesive pump forces adhesive to and through the second passageway of the base portion and into and through the second passageway of the adhesive distributing portion to the interior of the adhesive distributing portion. Adhesive emanates from the interior of the adhesive distributing portion under the force of the adhesive pump and into an annulus. The base portion includes an adhesive drain well which collects adhesive that has not been used in coating the threads of a threaded device.

Still referring to externally threaded devices, alternatively, the adhesive distributing portion includes a plurality of second passageways and the plurality of second passageways of the adhesive distributing portion extend to the interior of the adhesive distributing portion. The adhesive distributing portion includes a circumferential groove in the exterior of the adhesive distributing portion which communicates with the second passageway. Alternatively, the adhesive distributing portion includes a circumferential groove in the exterior of the adhesive distributing portion and the circumferential groove communicates with the plurality of second passageways. Each of the plurality of the second passageways of the adhesive distributing portion extend radially to the interior of the adhesive distributing portion.

Still referring to externally threaded devices, the base portion includes an inner shoulder, the adhesive distributing portion engages the inner shoulder of the base portion, and the adhesive distributing portion resides within the interior of the base portion. The adhesive used in the applicator is preferably an anaerobic adhesive which adheres to metal in the absence of oxygen.

A process of applying adhesive to an internally threaded device is disclosed and claimed which includes the step of placing the threaded device upon the base portion of the adhesive applicator. The base portion supports the threaded device. Pumping anaerobic adhesive is performed utilizing a peristaltic pump to avoid contact of the anaerobic adhesive with the metal components of the pump. Rollers of the peristaltic pump compress a flexible tube pushing and forcing the anaerobic adhesive through the tube without contacting any metal parts of the tube. The anaerobic adhesive does not adhere to plastic or elastomeric materials. The peristaltic pump pumps anaerobic adhesive from a reservoir to the adhesive applicator for coating the threads of a threaded device. The adhesive is routed through a first passageway in the base portion of the adhesive applicator and then it is routed through a plurality of passageways in the adhesive distributing portion of the adhesive applicator. Adhesive is discharged from the plurality of passageways to the exterior of the adhesive distributing portion of the adhesive applicator and the threaded device surrounds the exterior of the adhesive distributing portion proximate the threaded device. Adhesive is forced into a gap between the adhesive distributing portion and the threaded device and the threads of the threaded device are coated with the adhesive.

The step of discharging adhesive from the plurality of passageways to the exterior of the adhesive distributing portion proximate the threaded device is followed by the step of spreading the adhesive in a circumferential groove in the exterior of the adhesive distributing portion of the adhesive applicator proximate the threaded device. The plurality of passageways in the adhesive distributing portion of the adhesive applicator are preferably radial passageways. An additional step of draining excess adhesive from the gap between the adhesive distributing portion and the threaded device is also preferably performed in the process.

A process of applying adhesive to an externally threaded device includes the steps of placing the threaded device upon a depth stop which controls the depth of insertion of the threaded device or stud into the adhesive applicator. Exter-

nally threaded devices may involve the use of a depth stop that is calibrated or sized for the location of the threads on the stop. The depth stop engages the base portion and the depth stop supports the threaded device. Adhesive is pumped utilizing a peristaltic pump from an adhesive reservoir to the adhesive applicator for coating threads of the threaded device. Adhesive is routed through a first passageway in the base portion of the adhesive applicator and it then spreads and flows in a circumferential groove in the exterior of the adhesive distributing portion of the adhesive applicator. The adhesive is routed through a plurality of passageways in the adhesive distributing portion of the adhesive applicator and is discharged from the plurality of passageways to an annulus in the interior of the adhesive distributing portion of the adhesive applicator. The adhesive distributing portion surrounds the threaded device and forces adhesive into a gap between the adhesive distributing portion and the threaded device coating the threads of the threaded device with the adhesive. The plurality of passageways in the adhesive distributing portion of the adhesive applicator are preferably radial passageways. Preferably, excess adhesive is drained from the gap between the adhesive distributing portion and the threaded device. When the fastener is then affixed to a mating threaded component, the adhesive is then spread to all of the threads of the fastener and the mating threaded component.

It is an object of the invention to facilitate the application of adhesive coating to threaded fasteners.

It is an object of the invention to facilitate the application of adhesive coating to threaded fasteners made of metal.

It is an object of the invention to apply anaerobic thread locking adhesive to threaded fasteners made of metal in a controlled manner so that the threaded fasteners are completely covered with adhesive.

It is an object of the invention to apply anaerobic thread locking adhesive to threaded fasteners in a way to minimize waste of adhesive.

It is an object of the invention to apply anaerobic thread locking adhesive to threaded fasteners using a plastic adhesive applicator.

It is an object of the invention to apply anaerobic thread locking adhesive to threaded fasteners made of metal using a nylon adhesive applicator.

It is an object of the invention to apply the correct amount of thread locking adhesive to the threads of threaded fasteners made of metal.

It is an object of the invention to apply anaerobic thread locking adhesive to threaded fasteners made of metal.

These and other objects will be best understood when reference is made to the drawings and the description of the invention hereinbelow.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the first example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, and the adhesive distributing portion of the applicator with an internally threaded fastener placed around the adhesive distributing portion of the applicator.

FIG. **1**A is a perspective view of the first example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, and the adhesive distributing portion of the applicator without a threaded fastener placed around the adhesive distributing portion of the applicator.

FIG. **1**B is an exploded perspective view of the first example of the adhesive applicator illustrated in FIG. **1**.

FIG. **1**C is an enlarged portion of FIG. **1**B illustrating the internally threaded fastener.

FIG. **1**D is an enlarged portion of FIG. **1**B illustrating the adhesive distributing portion of the first example of the adhesive applicator.

FIG. **1**E is a front view of the adhesive distributing portion of the first example of the adhesive applicator illustrated in FIGS. **1**D, **1**B and **1**A.

FIG. **1**F is a bottom view of the adhesive distributing portion of the first example of the adhesive applicator illustrated in FIGS. **1**D, **1**B and **1**A.

FIG. **1**G is a top view of the first example of the adhesive applicator of FIG. **1**.

FIG. **1**H is a front view of the first example of the adhesive applicator of FIG. **1**G and FIG. **1**.

FIG. **2** is a cross-sectional view of the first example of the adhesive applicator taken along the lines **2**-**2** of FIG. **1**G.

FIG. **2**A is an enlargement of a portion of FIG. **2** illustrating the seal between the base portion of the applicator and the adhesive distributing portion of the first example of the adhesive applicator.

FIG. **2**B is an enlargement of a portion of FIG. **2** illustrating the threaded fastener, a passageway in the adhesive distributing portion for communicating adhesive to a circumferential groove in the adhesive distributing portion, a gap between the threaded fastener and the upper portion of the base portion, and an opening leading to the well in the lower portion of the base portion.

FIG. **2**C is the same as FIG. **1**B only adhesive is shown in the passageway in the adhesive distributing portion, adhesive is shown in the circumferential groove in the adhesive distributing portion, and, adhesive is shown in the gap between the threaded fastener and the upper portion of the base portion completely coating the threads of the threaded fastener proximate the gap.

FIG. **3** is a cross-sectional view of the first example of the adhesive applicator taken along the lines **3**-**3** of FIG. **1**G.

FIG. **4** is a cross-sectional view of the first example of the adhesive applicator taken along the lines **4**-**4** of FIG. **3** and FIG. **1**H

FIG. **5** is a perspective view of the second example of the adhesive applicator illustrating the pressure tube, the drain tube, and the base portion.

FIG. **5**A is an exploded perspective view of the second example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, the adhesive distributing portion, the externally threaded stud and the cap portion.

FIG. **5**B is a front view of the second example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, the cap and the threaded stud.

FIG. **5**C is a top view of the second example of the adhesive applicator.

FIG. **5**D is a cross-sectional view of the second example of the adhesive applicator taken along the lines **5**D-**5**D of FIG. **5**B illustrating the pressure tube, the drain tube, the circumferentially extending groove, and radially extending passageways for supplying adhesive to the threaded stud.

FIG. **5**E is a cross-sectional view of the second example of the adhesive applicator taken along the lines **5**E-**5**E of FIG. **5**C.

FIG. **5**F is an enlargement of a portion of FIG. **5**E illustrating the externally threaded stud and an annulus for spreading adhesive around the externally threaded stud.

FIG. **5**G is similar to FIG. **5**F but additionally illustrates the adhesive in the annulus and surrounding the externally threaded stud.

FIG. **6** is a schematic view of a peristaltic pump, an adhesive reservoir, and the first example of the adhesive applicator.

FIG. **6**A is a schematic view of a peristaltic pump, an adhesive reservoir, and the second example of the adhesive applicator.

DESCRIPTION OF THE INVENTION

FIG. **1** is a perspective view **100** of the first example of the adhesive applicator **199** illustrating the pressure tube **104**T, the drain tube **105**T, the base portion **103**, and the adhesive distributing portion **103** of the applicator with an internally threaded fastener **101** placed around the adhesive distributing portion **102** of the adhesive applicator. The threaded fastener **101** includes a cylindrical lip **101**C. The threaded fastener is shown by example only and other threaded fasteners may be used. Nut **104**N secures pressure supply tube **104**T to the pressure supply port. Nut **105**N secures drain supply tube **105**T to the drain supply port. An adhesive distributing portion **102** includes a chamfer **102**C illustrated in FIG. **1**. Threaded fastener **101** includes lugs **101**L and these lugs are used for tightening the fastener to another assembly not shown. Base portion **103** is illustrated in FIG. **1** and includes a lower portion **103**L, upper portion **103**U, and step **103**S. Bolts, **106**B, **107**B, securing adhesive distributing portion **102** to the base portion **103** are also shown in FIG. **1**.

Still referring to FIG. **1**, the structure illustrated is generally cylindrically shaped and is preferably made of nylon. Other plastics may be used. Plastics are used because the anaerobic adhesives used in securing threaded devices made of metal to other metal components do not adhere to plastics.

FIG. **1**A is a perspective view **100**A of the first example of the adhesive applicator **199** illustrating the pressure tube **104**T, the drain tube **105**T, the base portion **103**, and the adhesive distributing portion **102** of the applicator without a threaded fastener placed around the adhesive distributing portion **102** of the adhesive applicator. Circumferential groove **102**G is illustrated in the exterior wall **102**W of the adhesive distributing portion **102**. Adhesive emanates from distribution ports **102**P and spreads in the circumferential groove **102**G when an internally threaded device, for example bearing nut **101**, is in place as indicated in FIGS. **1** and **1**B. Slot **198** permits adhesive not used on threads **101**T of the threaded device **101** to fall under the influence of gravity to well **103**W in the base portion. Slot **198** provides a path for adhesive to flow when no threaded device resides around the adhesive distributing portion. Integral tabs **103**T are shown in FIG. **1**A and the bearing nut **101** sits on and is supported by said tabs as illustrated in FIG. **1**. Tabs **103**T space the bearing nut apart from the upper portion **103**U of the base portion.

FIG. **1**B is an exploded perspective view **100**B of the first example of the adhesive applicator **199** illustrated in FIG. **1**. Inner threads **101**T are illustrated in bearing lock device **101**. Adhesive distributing portion **102** with through holes **102**H are illustrated along with bolts **106**B, **107**B which interengage threaded holes **103** in the upper surface **103**B of cylindrical inner portion **103**C of the base portion **103**. Still referring to FIG. **1**B, circular seal recess **103**G is illustrated in the upper surface **103**B. Seal **180** shown in FIG. **1**B resides in circular seal recess **103**G. Seal **180** is an elastomeric seal and is best viewed in FIG. **2**. FIG. **2** is a cross-sectional view **200** of the first example of the adhesive applicator **199** taken along the lines **2-2** of FIG. **1**G.

Still referring to FIG. **1**B, centrally located flow port **103**F for communicates adhesive from the base portion **103** to the adhesive distributing portion **102**. Flow port **103**F is interconnected to pressure tube **104**T as described below and as illustrated in FIG. **2**. Drain well **103**W is illustrated well in FIG. **1**B and functions as an accumulator for unused adhesive.

FIG. **1**C is an enlarged portion **100**C of FIG. **1**B illustrating more detail of the threads **101**T of threaded fastener **101**. FIG. **1**D is an enlarged portion **100**D of FIG. **1**B illustrating more detail of the discharge ports **102**P in the circumferential groove **102**G the adhesive distributing portion **102** of the first example of the adhesive applicator **199**. FIG. **1**E is a front view **100**E of the adhesive distributing portion **102** of the first example of the adhesive applicator **199** illustrated in FIGS. **1**D, **1**B and **1**A. FIG. **1**F is a bottom view **100**F of the adhesive distributing portion **102** of the first example of the adhesive applicator **199** illustrated in FIGS. **1**D, **1**B and **1**A. FIG. **1**F illustrates the cylindrically shaped bottom portion **202**B and the shoulder **202**S. Shoulder **202**S of the adhesive distributing portion, and the outer surface of the cylindrically shaped **202**C bottom portion of the adhesive distributing portion are illustrated in FIG. **1**F. The integral cylindrical portion **103**C of base portion **103** of adhesive applicator, the well portion **103**W and the inner wall **103**I of the base portion **103** form a drain passage (drain well) from which unused adhesive is recycled to a reservoir **601**R. See FIGS. **1** and **2**.

FIG. **6** is a schematic view **600** of a peristaltic pump **601**P, an adhesive reservoir **601**R, and the first example of the adhesive applicator **199** which shows the adhesive application from a system standpoint. FIG. **6** also illustrates a flexible adhesive supply tube **104**S leading from reservoir **601**R, through pump **601**P and to the supply port of the adhesive applicator **199**. Drain return line **105**R extends from the drain port of the adhesive applicator **199** to the reservoir **601**R. The adhesive is denoted by reference numeral **601**A. Reservoir **601**R is also made of plastic to prevent the adhesive from setting up in the reservoir. FIG. **6**A is a schematic view **600**A of a peristaltic pump **601**P, an adhesive reservoir **601**R, and the second example of the adhesive applicator **599** similar to FIG. **6**.

FIG. **1**G is a top view **100**G of the first example of the adhesive applicator **199** of FIG. **1**. FIG. **1**H is a front view **100**H of the first example of the adhesive applicator **199** of FIG. **1**G and FIG. **1** illustrating the bearing lock nut **101** engaging integral tabs **103**T of the base portion **103**.

FIG. **2** is a cross-sectional view **200** of the first example of the adhesive applicator **199** taken along the lines **2-2** of FIG. **1**G. Passageway **201**L is shown in FIG. **2** extending from the pressure port (to which tube **104**T is connected) to the center of base portion **103**. Passageway **201**V extends upwardly from passageway **201**L to flow port **103**F. Together passageways **201**L and **201**V are referred to as the first passageway in the base portion **103**. Top surface **103**B of the cylindrical portion **103**C engages bottom surface **202**B of the adhesive distributing portion **102**. FIG. **2**A is an enlargement of a portion **200**A of FIG. **2** illustrating the seal **180** between the upper surface **103**B of the base portion **103** of the adhesive applicator and the bottom surface **202**B of the adhesive distributing portion **102** of the first example of the adhesive applicator **199**.

Still referring to FIG. **2**, the first passageway **201**L, **201**V is in fluidic communication with vertical passageway **211**V of the adhesive distributing portion **102**. Vertical passageway **211**V is in communication with radially extending passageways **202**, **203**, **204**, **205**, **206**, **207**, **208**, and **209**. Sometimes herein the vertical passageway **211**V in combination with any one of the radially extending passageways **202**, **203**, **204**, **205**, **206**, **207**, **208**, and **209** is referred to herein as the second passageway. Sometimes herein the vertical passageway **211**V in combination with all of the radially extending passageways **202**, **203**, **204**, **205**, **206**, **207**, **208**, and **209** is referred to herein as a plurality of second passageways or as just a plu-

rality of passageways. Reference numeral **202**T denotes the top of the adhesive distributing portion.

FIG. **4** is a cross-sectional view **400** of the first example of the adhesive applicator **199** taken along the lines **4-4** of FIG. **3** and FIG. **1**H and illustrates passageways **211**V, **202**, **203**, **204**, **205**, **206**, **207**, **208**, and **209**. Passageways **202**, **203**, **204**, **205**, **206**, **207**, **208**, and **209** extend radially to circumferential groove **102**G. Adhesive extends radially in passageways **202**, **203**, **204**, **205**, **206**, **207**, **208**, and **209** and spreads circumferentially in groove **102**G. Referring to FIGS. **2**B and **2**C, the adhesive as it is being pumped in the passageways extends radially outwardly into the gap **198**A and proceeds into the thread pattern adjacent groove **102**G. As the adhesive extends radially outwardly it also extends circumferentially in the circumferential groove **102**G. In the adhesive distributing portion described herein there are 8 radially extending passageways. Other examples may use more or less radially extending passageways depending on the configuration of the threaded device whose threads are to be coated. For instance, if the threaded device includes numerous threads which extend a considerable length then more radially extending passageways may be used. Further, the flow rate and pressure of the adhesive may be adjusted by using a different pump that supplies more adhesive at a different pressure. Additionally, the size of the circumferential groove may be adapted to accommodate the threads to be coated. The internally threaded device whose threads are coated is then mated with a reciprocally threaded device which spreads the adhesive into all of the threads of the internally threaded device and which spreads adhesive into all of the threads of the reciprocally threaded device.

FIG. **3** is a cross-sectional view **300** of the first example of the adhesive applicator **199** taken along the lines **3-3** of FIG. **1**G. FIG. **3** illustrates the vertical passageways **201**V and **211**V. As stated previously passageway **201**V is part of the first passageway of the base portion and passageway **211**V is part of the second passageway(s) of the adhesive distributing portion **102**. FIG. **3** also illustrates drain passageway **302** and flow arrow **301** denoting the path of unused adhesive being returned to the adhesive reservoir. Drain well **103**W extends 360° within the base portion **103**.

FIG. **2**B is an enlargement **200**B of a portion of FIG. **2** illustrating the threaded fastener **101**, a passageway **203** in the adhesive distributing portion **102** for communicating adhesive **601**A to a circumferential groove **102**G in the adhesive distributing portion **102**, a gap between the threaded fastener **101** and the upper portion **103**U of the base portion **102**, and an opening **221** leading to the well **103**W in the lower portion **103**L of the base portion **103**. Reference numeral **198**A denotes a gap between the threads **101**T of the bearing lock nut **101** and the wall surface **102**W of the adhesive distributing portion.

FIG. **2**C is the same view **200**C as FIG. **1**B only: adhesive **601**A is shown in the passageway **203** in the adhesive distributing portion **102**, adhesive is shown in the circumferential groove **102**G in the adhesive distributing portion, and adhesive is shown in the gap between the threaded fastener **101** and the upper portion **103**U of the base portion **103** completely coating the threads **101**T of the threaded fastener **101**.

FIG. **5** is a perspective view **500** of the second example of the adhesive applicator **599** illustrating the pressure tube **504**T and nut **504**N securing the tube with respect to the applicator **599**, the drain tube **505**T and nut **505**N securing the tube with respect to the applicator **599**, and the base portion **503**. Cap **503**C is secured to the base portion **503** with fasteners **503**F. Threaded stud **501**S is shown protruding from the second example of the adhesive applicator **599**. Tapered surface **506**T of the adhesive distributing portion **506**A is also illustrated in FIG. **5**.

FIG. **5**A is an exploded perspective view **500**A of the second example of the adhesive applicator **599** illustrating the pressure tube **504**T, the drain tube **505**T, the base portion **503**, the adhesive distributing portion **506**A, and the cap portion **503**C. Base portion **506** includes lower portion **503**L and upper portion **503**U. Threaded holes **503**H in the upper portion **503**U of the base portion **503** receive fasteners **503**F to secure the adhesive distributing portion **506**A within the base portion **503**. Adhesive distributing portion **506**A includes a bottom **506**B which engages an inner shoulder **503**S of the base portion **503** and the adhesive distributing portion **506**A is supported thereby. See FIG. **5**E, a cross-sectional view **500**E of the second example of the adhesive applicator **599** taken along the lines **5**E-**5**E of FIG. **5**C. FIG. **5**C is a top view **500**C of the second example of the adhesive applicator **599**.

Referring again to FIGS. **5**A and **5**E, depth stop **503**D is illustrated and functions to control the insertion depth of the threaded stud **501**S within the adhesive applicator **599**. Threaded stud includes exterior threads **501**T which fits within the adhesive distributing portion **506**A. Tapered surface **506**T guides the stud **501**S as it is placed within the adhesive distributing portion **506**A. Adhesive distributing portion **506**A includes an inner bore **506**I and an exterior **506**E. A groove **506**G extends circumferentially around the exterior of the adhesive distributing portion **506**A and discharge ports **506**P expel adhesive therefrom. Adhesive **601**A is expelled radially out the discharge ports and the adhesive also spreads in the circumferential groove **506**G.

Referring to FIG. **5**E, the depth stop **503**D limits the position of the externally threaded stud **501**S as shown. Depth stop **503**D resides in bore **540**B and is supported thereby. Flow path **541** of unused adhesive is illustrated in FIG. **5**E. Stud **501**S fits within the inner bore **506**I of the adhesive distributing portion **506**A. A first passageway **542** in the upper portion **503**U communicates with the exterior circumferential groove **506**G of the adhesive distributing portion **506**A. As anaerobic adhesive is pumped into groove **506**G it spreads circumferentially between the inner wall **503**I of the base portion **503** and the exterior groove **506**G of the adhesive distributing portion **506**A. Groove **506**G, in turn, is interconnected with a plurality of inwardly radially extending second passageways **511**, **512**, **513**, **514**, **515** and **516** which terminate in a circumferentially extending internal groove or annulus **543** in which adhesive spreads circumferentially in groove **543**. Simultaneously with the circumferential spread of adhesive, the adhesive continues radially inwardly to coat the threads adjacent annulus **543**. Gap **549**A exists between threads **501**T of stud **501**A and the inner bore **506**I of the adhesive distributing portion **506**A. Unused adhesive falls downwardly in gap **549**A under the influence of gravity into well **503**W of the base portion **503**. Threaded stud **501**S is centered by the inner circumferentially shaped surface **506**I. Even if the stud **501**S is somewhat off-center, the threads are sufficiently coated. Radially extending second passageways **511**, **512**, **513**, **514**, **515** and **516** are sealed by two elastomeric seals **509**, **510** which reside in unnumbered grooves in the exterior of the adhesive distributing portion **506**A.

Referring to FIGS. **5**, **5**A and **5**E, tapered surface **506**T of the adhesive distributing portion aids insertion of the threaded stud **501**S. FIG. **5**B is a front view **500**B of the second example of the adhesive applicator **599** illustrating the pressure tube, the drain tube, the base portion, the cap and the threaded stud. FIG. **5**D is a cross-sectional view **500**D of the second example of the adhesive applicator **599** taken along

the lines **5**D-**5**D of FIG. **5**B illustrating the pressure tube, the drain tube, the circumferentially extending groove **506**G, the radially extending passageways **511**, **512**, **513**, **514**, **515** and **516** for supplying adhesive to the threaded stud, and the internal circumferential groove **543** extending about threads **501**T of the stud. Gap **549**A between the threads **501**T and the inner bore **506**I of the adhesive distributing portion **506** is illustrated in FIGS. **5**D, **5**E, and **5**F.

FIG. **5**F is an enlargement **500**F of a portion of FIG. **5**E illustrating circumferentially extending internal groove or annulus **543** in which adhesive spreads circumferentially therein. Gap **549**A between the threads **501**T and the inner bore **506**I of the adhesive distributing portion **506** is illustrated well in FIG. **5**E. FIG. **5**G is a view **500**G similar to FIG. **5**F but additionally illustrates adhesive **601**A in the annulus **543** and surrounding a portion of the externally threaded stud **501**T. When the externally threaded stud partially coated with adhesive mates with a reciprocally threaded device, the adhesive is shared between all of the threads of the stud and all of the threads of the reciprocally threaded device.

A process of applying adhesive to an internally threaded device is disclosed and claimed which includes the step of placing the threaded device **101** upon the base portion **103** of the adhesive applicator **199**. The base portion **103** supports the threaded device **101**. Pumping anaerobic adhesive is performed utilizing a peristaltic pump **601**P to avoid contact of the anaerobic adhesive **601**A with the metal components of the pump. Rollers of the peristaltic pump **601**P compress a flexible tube **104**S pushing and forcing the anaerobic adhesive through the tube without contacting any metal parts of the pump. The anaerobic adhesive **601**A does not adhere to plastic or elastomeric materials. The tubing used is oxygen permeable to prevent the anaerobic adhesive from setting up. The peristaltic pump supplies anaerobic adhesive from a reservoir **601**R to the adhesive applicator **199** for coating the external threads **101**T of a threaded device. The adhesive is routed through a first passageway **201**L, **201**V in the base portion **103** of the adhesive applicator **199** and then it is routed through a plurality of passageways **211**V, **202**, **203**, **204**, **205**, **206**, **207**, **208**, **209** in the adhesive distributing portion **102** of the adhesive applicator **199**. Adhesive is discharged from the plurality of passageways to the exterior of the adhesive distributing portion of the adhesive applicator and the threaded device surrounds the exterior of the adhesive distributing portion proximate the threaded device. Adhesive is forced into a gap **198**A between the adhesive distributing portion **102** and the threaded device **101** and the threads **101**T of the threaded device are coated with the adhesive.

The step of discharging adhesive from the plurality of passageways to the exterior of the adhesive distributing portion proximate the threaded device is followed by the step of spreading the adhesive in a circumferential groove **102**G in the exterior wall **102**W of the adhesive distributing portion **102** of the adhesive applicator proximate the threaded device. The plurality of passageways in the adhesive distributing portion of the adhesive applicator are radial extending passageways. An additional step of draining excess adhesive from the gap **198**A between the adhesive distributing portion and the threaded device is also preferably performed in the process.

A process of applying adhesive to an externally threaded device **501**A includes the steps of placing the threaded device upon a depth stop **503**D which controls the depth of insertion of the threaded device or stud into the adhesive applicator **599**. Externally threaded devices may involve the use of a depth stop **503**D that is calibrated or sized for the location of the threads **501**T on the stop. The depth stop **501**T engages the base portion **503** and the depth stop supports the threaded device. Adhesive is pumped utilizing a peristaltic pump **601**P from an adhesive reservoir **601**R to the adhesive applicator **599** for coating external threads **501**T of the threaded device. Adhesive is routed through a first passageway **542** in the base portion of the adhesive applicator and it then spreads and flows in a circumferential groove **506**G in the exterior of the adhesive distributing portion **506**A of the adhesive applicator **599**. The adhesive is routed through a plurality of passageways **511**, **512**, **513**, **514**, **515**, **516** in the adhesive distributing portion **506**A of the adhesive applicator and is discharged from the plurality of passageways to an annulus **543** in the interior of the adhesive distributing portion of the adhesive applicator. The adhesive distributing portion surrounds the threaded device **501**S and forces adhesive into a gap **549**A between the adhesive distributing portion and the threaded device coating the threads of the threaded device with the adhesive. The plurality of passageways in the adhesive distributing portion of the adhesive applicator are inwardly extending radial passageways. Preferably, excess adhesive is drained from the gap between the adhesive distributing portion and the threaded device.

REFERENCE NUMERALS

100—perspective view of the first example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, and the adhesive distributing portion of the applicator with a threaded fastener placed around the adhesive distributing portion of the applicator.

100A—perspective view of the first example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, and the adhesive distributing portion of the applicator without a threaded fastener placed around the adhesive distributing portion of the applicator

100B—an exploded perspective view of the first example of the adhesive applicator illustrated in FIG. **1**

100C—an enlarged portion of FIG. **1**B illustrating the threaded fastener

100D—an enlarged portion of FIG. **1**B illustrating the adhesive distributing portion of the first example of the adhesive applicator

100E—a front view of the adhesive distributing portion of the first example of the adhesive applicator illustrated in FIGS. **1**D, **1**B and **1**A

100F—a bottom view of the adhesive distributing portion of the first example of the adhesive applicator illustrated in FIGS. **1**D, **1**B and **1**A

100G—a top view of the first example of the adhesive applicator of FIG. **1**

100H—a front view of the first example of the adhesive applicator of FIG. **1**G and FIG. **1**.

101—threaded fastener, bearing nut

101C—cylindrical lip on fastener

101L—lug of fastener

101T—threaded interconnection on fastener

102—adhesive distributing portion of adhesive applicator

102C—chamfered edge of adhesive distributing portion

102G—circumferential groove in exterior of adhesive distributing portion

102H—through holes in the adhesive distributing portion

102P—ports for delivering adhesive to threaded fastener

102W—wall of adhesive distributing portion

103—base portion

103B—top surface of adhesive applicator which engages the adhesive distributing portion

103C—integral cylindrical portion of base portion of adhesive applicator
103F—fluid supply port in integral cylindrical portion
103G—circular seal recess
103H—threaded receptacles which received threaded bolts **106**B, **107**B
103L—lower portion of base portion
103R—seal
103S—shoulder on the exterior of the adhesive applicator
103U—upper portion of base portion of adhesive applicator
103W—well in the base portion collecting adhesive
104N—nut securing pressure tube
104S—supply hose to adhesive applicator
104T—pressure supply tube
105N—nut securing drain tube
105R—return line to reservoir **601**R
105T—drain tube
106B—plastic bolt
107B—plastic bolt
180—elastomeric seal
198—slot between adhesive distributing portion **102** and base portion **103**
199—first example of adhesive applicator
200—a cross-sectional view of the first example of the adhesive applicator taken along the lines **2**-**2** of FIG. **1**G
200A—an enlargement of a portion of FIG. **2** illustrating the seal between the base portion of the applicator and the adhesive distributing portion of the first example of the adhesive applicator
200B—an enlargement of a portion of FIG. **2** illustrating the threaded fastener, a passageway in the adhesive distributing portion for communicating adhesive to a circumferential groove in the adhesive distributing portion, a gap between the threaded fastener and the upper portion of the base portion, and an opening leading to the well in the lower portion of the base portion
201L—passageway in lower portion of base portion carrying adhesive from the exterior of the base portion to the a vertical passageway **201**V
201V—vertical passageway in lower portion of base portion communicating adhesive
211V—vertical passageway in adhesive distributing portion of the adhesive applicator
202, **203**, **204**, **205**, **206**, **207**, **208**, **209**—radially extending passageway from the vertical passageway **211**V to groove **103** in the exterior of the adhesive distributing portion
202B—base of adhesive distributing portion **102**
202C—lower cylindrical portion of adhesive distributing portion **102**
202S—shoulder portion of adhesive distributing portion **102**
202T—top of adhesive distributing portion **102**
220—gap between threaded fastener **101** and upper portion **103**U of base portion
221—drain port
223C—adhesive in passageway
299—first example of adhesive applicator in cross-section
300—a cross-sectional view of the first example of the adhesive applicator taken along the lines **3**-**3** of FIG. **1**G
301—arrow indicating the drainage of unused adhesive
302—port drainage of unused adhesive
400—a cross-sectional view of the first example of the adhesive applicator taken along the lines **4**-**4** of FIG. **3** and FIG. **1**H
500—a perspective view of the second example of the adhesive applicator illustrating the pressure tube, the drain tube, and the base portion
500A—an exploded perspective view of the second example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, the adhesive distributing portion, and the cap portion.
500B—a front view of the second example of the adhesive applicator illustrating the pressure tube, the drain tube, the base portion, the cap and the threaded stud
500C—a top view of the second example of the adhesive applicator
500D—a cross-sectional view of the second example of the adhesive applicator taken along the lines **5**D-**5**D of FIG. **5**B illustrating the pressure tube, the drain tube, the circumferentially extending groove, and radially extending passageways for supplying adhesive to the threaded stud
500E—a cross-sectional view of the second example of the adhesive applicator taken along the lines **5**E-**5**E of FIG. **5**C
500F—enlarged portion of FIG. **5**E
501S—threaded stud with exterior threads
501T—thread on stud
503—base portion, second example
503C—cap
503D—depth measure
503F—fastener for caps
503H—holes in base portion for receiving studs
503I—inner surface of base portion
503L—lower portion of base portion
503S—internal shoulder in the base portion
503U—upper portion of the base portion
503W—adhesive well
504N—nut for securing pressure supply tube
504T—pressure supply tube
505N—nut for securing drain supply tube
505T—drain tube
506A—adhesive distributing portion
506B—base or bottom portion of adhesive distributing portion
506E—exterior of the adhesive distributing portion
506G—circumferential groove in the adhesive distributing portion
506I—inner bore of adhesive distributing portion
506P—ports in the adhesive distributing portion
506T—tapered wall of adhesive distributing portion forming a cone
509, **510**—O-ring
511, **512**, **513**, **514**, **515**, **516**—radial passageways extending from the circumferential groove **506**G to the interior **506**I of the adhesive distributing portion **506**A
540B—bore supporting depth stop **503**D
541—path of unused adhesive returning to adhesive reservoir
542—first passageway in base portion
543—circumferentially extending internal groove or annulus in which adhesive spreads circumferentially
549A—gap between inner wall **506**I of the adhesive distributing portion and threads of the stud
599—second example of the adhesive applicator
600—a schematic view of a peristaltic pump, an adhesive reservoir, and the first example of the adhesive applicator
601A—adhesive
601P—peristaltic adhesive pump
601R—reservoir of adhesive
600A—a schematic view of a peristaltic pump, an adhesive reservoir, and the second example of the adhesive applicator

Those skilled in the art will recognize that the invention has been set forth by way of example only and that changes and modifications may be made to the examples given without departing from the spirit and scope of the attached claims.

The invention claimed is:

1. A process of applying adhesive to a threaded device, comprising the steps of:

placing said threaded device upon a base portion of an adhesive applicator, said base portion supporting said threaded device;

pumping anaerobic adhesive, utilizing a peristaltic pump, from an adhesive reservoir to said adhesive applicator for coating threads of said threaded device;

routing said adhesive through a first passageway in said base portion of said adhesive applicator;

routing said adhesive through a plurality of passageways in an adhesive distributing portion of said adhesive applicator;

discharging adhesive from said plurality of passageways to an exterior of said adhesive distributing portion of said adhesive applicator, said threaded device surrounding said exterior of said adhesive distributing portion proximate said threaded device;

forcing adhesive into a gap between said adhesive distributing portion and said threaded device; and,

coating said threads of said threaded device with said adhesive.

2. The process of applying adhesive to a threaded device as claimed in claim 1 wherein said step of discharging adhesive from said plurality of passageways to said exterior of said adhesive distributing portion proximate said threaded device is followed by the step of spreading said adhesive in a circumferential groove in said exterior of said adhesive distributing portion of said adhesive applicator proximate said threaded device.

3. The process of applying adhesive to a threaded device as claimed in claim 2 wherein said plurality of passageways in said adhesive distributing portion of said adhesive applicator are radial passageways.

4. The process of applying adhesive to a threaded device as claimed in claim 1, further comprising the step of:

draining excess adhesive from said gap between said adhesive distributing portion and said threaded device.

5. The process of applying adhesive to a threaded device as claimed in claim 4 wherein said plurality of passageways in said adhesive distributing portion of said adhesive applicator are radial passageways.

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